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NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

ANALYZING THE EFFECTS OF NETWORK CENTRIC WARFARE ON WARFIGHTER EMPOWERMENT

by

Ahmed T. Williamson

June 2002

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**ANALYZING THE EFFECTS OF NETWORK CENTRIC WARFARE ON
WARFIGHTER EMPOWERMENT**

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Submitted in partial fulfillment of the
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ABSTRACT

NCW is a conceptual warfighting paradigm that seeks to exploit the advantages of information technologies to develop information superiority, leading to battlefield awareness and later escalating to battlefield dominance during future military operations. While military forces are currently experimenting within the framework of this new concept, efforts are being made to harness the opportunities made available by implementing network-centric concepts to increased operational efficiency and enhance combat power effectiveness so that optimal desired results may be achieved. However, the modern Marine Corps is comfortable and quite successful implementing its current, subordinate empowering doctrine of Maneuver Warfare, which emphasis the human behavioral aspects of warfare over technology implementation. The issue, then, is: how will Marine Corps warfighting performance be affected by changes in doctrine driven by advances in and the implementation of technology. This thesis seeks to answer this question through exploratory research of theoretical concepts on organizational performance, an examination of current and future warfighting concepts, and an assessment of the practicality of successfully implementing future warfighting concepts based upon the principles of a theoretical framework. Recommendations are provided for creation of a metric that will adequately assess the performance of empowered warfighters in a Network Centric Warfare environment.

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I. INTRODUCTION

The Information Age is upon us; an era when the world is connected by and has become increasingly dependant upon the newest innovations in information technology. In this ever-increasing technical world, the newest information technology systems appear in many facets of our everyday lives. From internet-based applications (e.g., e-commerce systems) to decision assistance technology (e.g., vehicle optimal path systems), the commercial industry has learned to do more, quicker, better, and farther; hence reaping more efficient results. Commercial and privatized organizations have discovered the advantages of employing information technology and exploiting information superiority. Thus, a new paradigm has been birthed; one in which global reach can be established through extensive networks and dominance can be maintained through information superiority: *Network-based Operations* (Roberts, 1998).

Historically, the military established new technologies and technological ideologies; now the military must learn from the civilian sector on how to gain and maintain global military superiority using principles of the new paradigm. In the military, the employment of this network-based paradigm is manifested as the Network Centric Warfare (NCW) concept – the idea of exercising information superiority to dominate the battlefield through closely linking (networking) all knowledgeable entities on the battlefield. Establishing this extensive network of entities (sensors, decision-makers, and weapons) will result in the ability of a military force to do more, quicker, better, and farther, too. It is anticipated that the NCW concept will achieve increased shared awareness, speed of command, operational tempo, lethality, survivability and self-synchronization; NCW will assist military forces to achieve a complete dominance of the battlefield through information superiority (Alberts, 1996; *JV2010*, 1996).

Even with rapid advances in and successful implementations of technology, it must not be discounted that humans have and will continue to play a primary and vital role in warfighting. Employing empowerment techniques has recently become a popular method of developing and inspiring effective leaders and managers in all types of organizations. To empower someone is to give them authority, choice, and confidence in matters that elicit competence, motivation, and energy. Empowered individuals are said to be more effective players within organizations, because they are invited to contribute directly to the organization's performance (Thomas & Tymon, 1993). Military warfighters, trained to operate in a decentralized environment and given autonomy and

authority, are benefactors of the empowerment principle. This is especially the case in the U.S. Marine Corps where subordinate participation and initiative is paramount (*Warfighting*, 1989). Empowering leadership has been successfully employed on battlefields by U.S. Marines for decades; hence, subordinate empowerment is a mainstay of Marine Corp leadership.

The question that surfaces, then, is: how will Marine Corps warfighting performance be affected by changes in doctrine driven by advances in and the implementation of technology. This thesis seeks to answer this question through exploratory research of theoretical concepts on organizational performance, an examination of current and future warfighting concepts, and an assessment of the practicality of successfully implementing future warfighting concepts based upon the principles of a theoretical framework.

A. PURPOSE

Why and how to employ future, network-based warfighting concepts, while accounting for the effects of the human behavioral aspects of warfare, is the central focus of this research. The issue at question is how will warfighters perform in a NCW environment where tactical units will be extensively linked and tightly coupled through a strategic communication network. Perhaps networking military units will result in the increased performance experienced by commercial organizations. However, perhaps operating in a NCW environment challenges the autonomy, authority, meaningfulness, and/or competence of the warfighter, minimizing the positive effects of subordinate empowerment. More specifically, the central question is how future warfighting doctrine, based on technical network capabilities, might influence the empowerment of warfighters.

The principal purpose of this research is to consider the potential impact of future warfighting concepts to the human behavioral aspects of warfighting. More specifically the focus is on the performance of empowered warfighters in a network-centered operational environment.

B. SCOPE OF THE STUDY

As stated above, this thesis seeks to answer a series of research questions that examine the relationship between warfighter empowerment and the network-based

military operations concept, NCW. This thesis will be shaped by an exploratory study of the theoretical concepts of organizational performance, an examination of current and future warfighting concepts, and an assessment of the practicality of successfully implementing future warfighting concepts. Since this is a broad topic for research and discussion, it is necessary to explicitly define the terms *warfighter* and *warfighting concept* as they relate to this specific work. Although at times throughout this thesis general military practices and procedures are loosely drawn upon, the central subject of this research is the U.S. Marine Corps.

The focus of study is on Marine Corps warfighters and warfighting practices. Therefore, any reference to the term *warfighter*, is to military personnel who have been taught, trained, and operate as U.S. Marines. Furthermore, the levels of command focused on in this research must be delineated. This study will not attempt to address the issues of warfighting at the strategic (theater) level of warfare. An analysis of this sort would require far greater assets, wider observation, and better understanding than could adequately provide at this time. This research does intend to examine and assess issues at the operational (intermediate) and tactical (actualizing) levels of warfare. Since units within a military force operate at different levels of war, based upon their scope of responsibilities, the decision-makers within each unit require a certain level of information to make well-informed decisions within their scope. A key issue that this research explores is the possibility that information technology allows tactical level actors (warfighters) to receive information, once limited to operational level planners that could empower lower-level subordinates with the decision authority to affect the conduct of war at what was once considered a higher level of responsibility. Therefore, for the purposes of this research, the term *warfighter* refers to Marine Corps personnel who are given the authority to make decisions and are in position to implement actions at the operational and tactical levels of war.¹

Additionally, the term *warfighting* refers to the doctrine, techniques, and practices of a military force to conduct, prepare, and train for war. The specific focus of this thesis is on Marine Corps warfighting doctrine, concepts, and practices. Maneuver Warfare is

¹ Appendix A: *Marine Corps Warfighting Doctrine* describes the Marine Corps' basic philosophy on warfighting as it relates to the nature, theory, and preparation for warfare. It is provided in this thesis in case the reader is not familiar with military terminology and concepts. The levels of warfare are more explicitly explained in that section.

the Marine Corps' current warfighting doctrine and will be explained in detail in this thesis. *Future warfighting* doctrine refers to those tactics, techniques, and procedures that may be necessary on the future battlefield given the global advances in technology.² The Revolution in Military Affairs (RMA) and Network-Centric Warfare (NCW) concepts will be discussed in this thesis as viable future warfighting concepts. Therefore, for the purposes of this research, the term *warfighting* refers to a Marine Corps unit's execution of current Maneuver Warfare doctrine, techniques, and practices; or its probable implementation of RMA or NCW concepts, tactics, and procedures on the future battlefield.

This thesis seeks to answer the following fundamental and supporting research questions:

- **What is Subordinate Empowerment?** How are empowered individuals developed? How do empowered individuals and empowerment-enhancing organizations perform relative to others? Is empowerment a phenomenon that is espoused by the military/Marine Corps?
- **What is Information Technology?** How has IT changed the way that we live? Does IT implementation improve organizational productivity? Has IT changed the nature of future warfare? How can IT be exploited to achieve market/battlefield superiority?
- **What is the NCW concept?** What is the network-centric concept/network-centric enterprising? How well do network-based organizations perform? How does NCW differ from current warfighting doctrine?
- **What is the relationship between NCW and empowerment?** What is the effect of employing NCW concepts on the empowerment of warfighters? How do empowered warfighters perform in a NCW environment?
- **Can the effectiveness of network-based military operations be measured and evaluated?** How can a theoretical model of empowerment

² Appendix B: *Factors for Future Warfighting* describes a newly developed philosophy on warfighting as it relates to the nature, theory, and preparation for warfare on the future, high-technology battlefield. This appendix is also provided in case the reader is not familiar with the terminology and concepts associated with this matter. This appendix presents foundation information for the discussion of RMA and NCW.

and information technology implementation be used to assess the performance of empowered warfighters in a NCW environment?

In addition to conducting an extensive literature review of empowerment theory and information technology implementation in order to establish a theoretical framework with which to evaluate Marine Corps Warfighting doctrine and concepts, this thesis was also to include a case study of experimental exercises conducted by Marine Corps units. However, upon further research, it was found that the type of real data necessary to analyze and assess the performance of warfighters in a network-based military operations environment is not available for reasons that will be explained later. Therefore, the scope of this research work shifted to an analysis of the current and potential Marine Corps warfighting ideologies utilizing the theoretical framework that was established through the literature review. The above research questions will still be answered through this approach. The thesis will conclude with recommendations for applying a viable method of measurement and evaluation of NCW as it impacts the empowerment of the warfighter.

C. METHODOLOGY

If NCW is to mature from concept-to-doctrine-to-practice, then the performance of networked-based military operations must become an operational art; it must be well practiced. In an effort to progress from theory to practice, American military forces have planned and conducted a series of experimental exercises to ensure that concepts, plans, equipment, and strategies are consistent with the principles of future warfare. Yet, regarding the experimentation with this approach to warfare, two fundamental questions prevail: How well are we doing; and how do we know how well we are doing? We must establish domains of criteria with which to evaluate the true effectiveness of NCW. Metrics must be identified to measure and assess the value of adopting this new paradigm. However, the metrics should not be limited just to measuring systems' performance, alone. Somehow, we must also capture the affects of human dynamics. The goal of this research is to answer the above research questions, propose methods to assess the development of NCW as it affects the empowerment of warfighters, and contribute to the field of study in metrics development.

I intend to accomplish the goals of this research by illustrating an exploratory research of theoretical concepts of organizational performance, establishing those concepts as a theoretical framework for future analysis using a systems approach to modeling, and then applying the theoretical framework to an examination and assessment of current and future warfighting concepts. The theoretical framework is presented using a systems approach to modeling organizational productivity and performance. Systems' modeling is appropriate when the matter being examined is complex enough that it needs to be broken down into components that are easier to understand and digest, as is the case

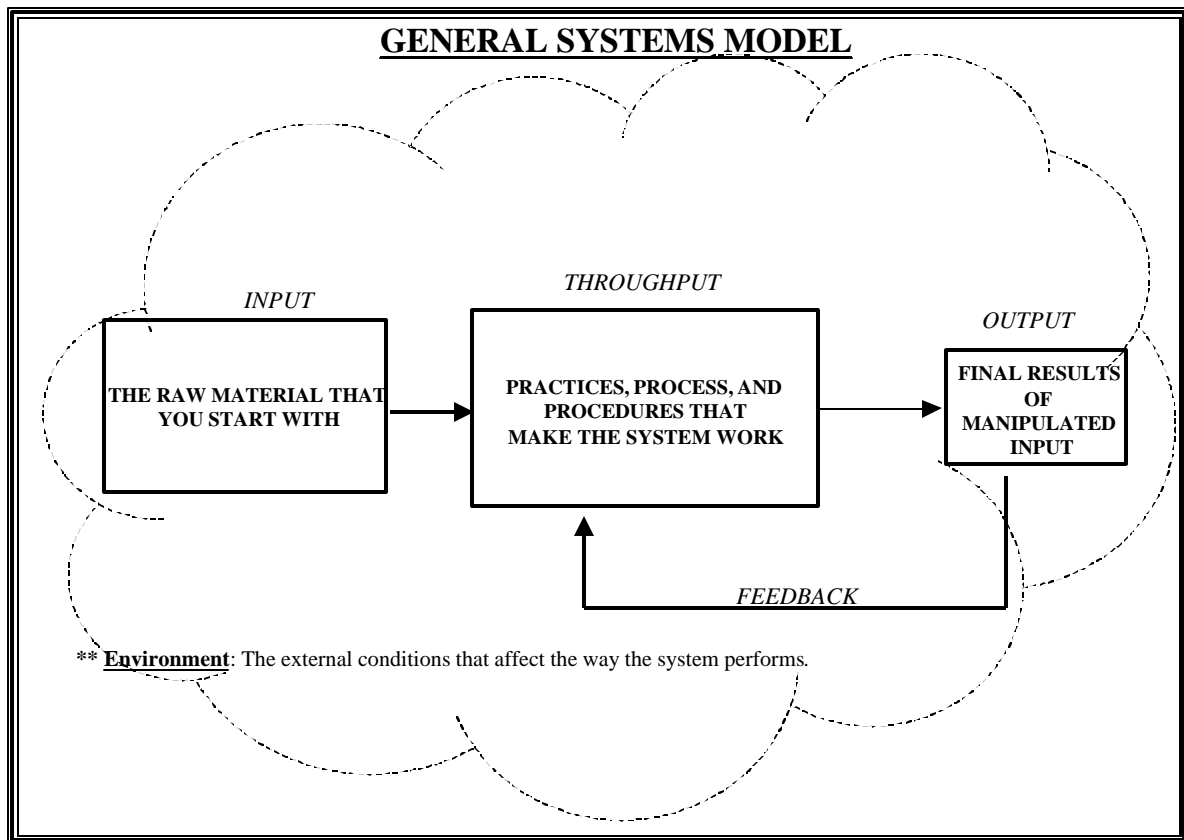


Exhibit 1.1

with each organizational paradigm. This thesis will present several models in systems-form to emphasize certain factors. The basic systems model, presented graphically in Exhibit 1.1, consists of *input*, *throughput*, *output*, *feedback*, and *the environment*. *Input* is simply the raw material that goes into the system; it is that with which you start. The *input* is processed at the *throughput* stage. *Throughput* usually consists of practices, processes, and procedures that make the system work. *Output* is the result of

manipulated *input*; it is that with which you end up. *Feedback* consists of corrective instructions that alter the *throughput* to get the desired *output* in the future. All systems exist in a particular *environment* of external factors that affect the way that the system performs.

In an effort to facilitate the detailed analysis of the three warfighting concepts, in relation to the organizational theories that will be presented in this thesis, I use the systems approach to analysis described in Exhibit 1.2. The exhibit depicts the components of a general systems model that describes the basic factors that affect organizational productivity. In general, organizations start with goals and assumptions

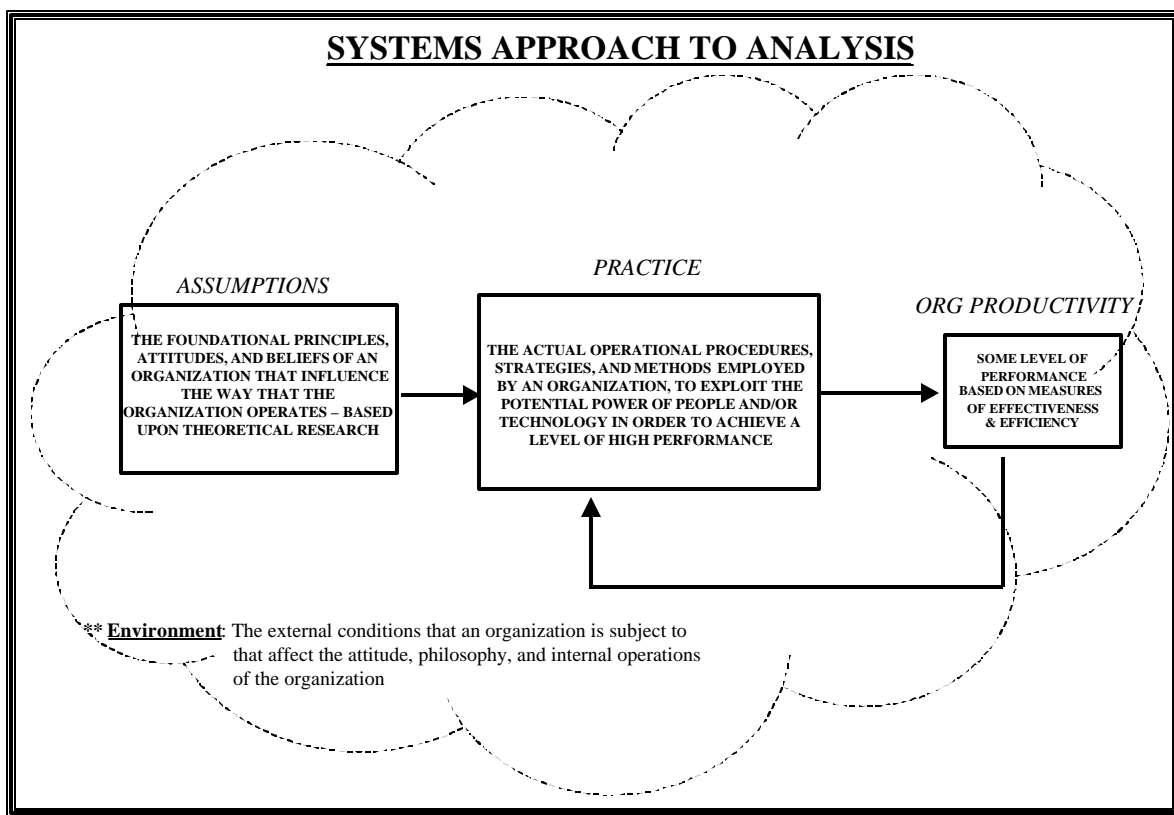


Exhibit 1.2

about how operations should be conducted based upon findings from theoretical research or observations. These assumptions guide the practices that organizations perform in an effort to exploit the potential power of people and/or technology with the goal of achieving a high level of performance. The practices and procedures that are conducted yield some level of organizational productivity. Practices are altered to increase/improve

organizational performance based upon the feedback received after evaluating the organization's productivity. The environmental context also affects the organization's performance and productivity. The measures of productivity are typically reflective of the original assumptions and theories of operation.

This basic model will be utilized to examine and assess current and future warfighting concepts, as it relates to theoretically established models of organizational performance.

D. ORGANIZATION OF THE STUDY

1. Chapter I: Introduction

The purpose of this chapter is to introduce the concepts of empowerment theory, information technology implementation, and network-based military operations, as well as set the stage for evaluating the relationship between these ideas. In this chapter, the central focus of employing future, network-based warfighting concepts, while accounting for the affects of the human behavioral aspects of warfare is identified and explained. Additionally, the scope of the research work, as well, as the methodology used to construct the argument is discussed.

2. Chapter II: Empowerment Theory

In this chapter, I present a review of literature to describe the origin of empowerment theory; to provide formal definitions and establish a working definition for the term *empowerment*; to explain how empowerment is developed, employed, and evaluated; to discuss what the implications of empowerment are on organizational performance; to introduce an assessment tool for the empowerment process; and to rationalize the applicability of empowerment to military warfighting.

3. Chapter III: Information Technology

In this chapter, the background information provided is obtained from an extensive literature review that defines the concept and applicability of information technology (IT) and how it can affect organizational dynamics. I explain what IT is, how IT has emerged as a dominant and necessary resource, how IT systems are currently

being implemented, the potential for future utilization of these tools, the implications of extended implementation, and possible applicability in military warfighting.

4. Chapter IV: The Generative Approach

This chapter explores the final model that will be used as an assessment tool for analysis. Before the Generative model is introduced, an explanation of organizational configurations is presented. Then, an argument for the utilization of the Generative model is presented, the key components of the Generative model are identified, and the implications of instituting a Generative organization are discussed. Finally, the relevance and applicability of this model in assessing military organizations operating under analogous circumstances is discussed.

5. Chapter V: Examining and Assessing Warfighting Concepts

The purpose of this chapter is to examine the Marine Corps' warfighting concepts as affected by the implementation of advanced information technologies and their integration with subordinate empowerment strategies. I focus on examining current, future, and hypothetically potential warfighting concepts as they relate to the issues of organizational design, human behavioral dynamics, process execution, process management, and varying methods of achieving organizational productivity through effectiveness and/or efficiency. In this chapter, warfighting concepts are the focus to mold an argument that will be applicable to Marine Corps command and control processes.

6. Chapter VI: Conclusions & Recommendations

This final chapter will re-emphasize the central purpose of the thesis by reviewing theoretical concepts presented throughout the work, answering the initial research questions of this study, and offering comprehensive conclusions relating to the research conducted. Finally, it will conclude with recommendations for applying a viable method of measurement and evaluation of NCW as it impacts the empowerment of the warfighter.

7. Appendix A: Marine Corps Warfighting Doctrine

Appendix A describes the Marine Corps' basic philosophy on warfighting as it relates to the nature, theory, and preparation for warfare. If the reader does not have a firm grasp of these concepts, it is suggested that Appendix A be reviewed particularly before reading Chapter V. Throughout that chapter, many ideas are presented based upon an understanding of Marine Corps warfighting doctrine.

8. Appendix B: Factors for Future Warfighting

Appendix B describes a newly developed philosophy on warfighting as it relates to the nature, theory, and preparation for warfare on the future, high-technology battlefield. If the reader does not have a firm understanding of these concepts, it is suggested that Appendix B be reviewed before reading Chapter V. Throughout that chapter, many ideas are presented based upon an understanding of future warfighting doctrine.

II. EMPOWERMENT THEORY

A. INTRODUCTION

Over the past few years in the business world, a significant amount of attention has been directed towards "high performance" organizations. Several factors have been identified as characteristics of these organizations including practices related to employee empowerment, shared decision-making, teamwork, and other notions that conjure up images of industrial democracy (CBCA, Feb 1997). Within the business/management arena, experts are learning that getting employees more involved in the decision-making process increases the overall productivity of an organization, which in-turn yields the highly touted "high-performance" organization. The concept of getting subordinates more involved in an organization's decision-making process in an effort to increase overall organizational performance is referred to as empowerment theory.

In this chapter, I will present a review of empowerment theory literature to describe the origin of empowerment theory; provide formal definitions and establish a working definition for the term *empowerment*; explain how empowerment is developed, employed, and evaluated; discuss what the implications of empowerment are on organizational performance; introduce an assessment tool for the empowerment process; and rationalize the applicability of empowerment to military warfighting.

B. ORIGIN OF EMPOWERMENT THEORY

The notion of empowerment comes from leadership theory, and as such, reflects many of the same ideas of human management practices that govern highly effective organizations. Since it is leadership's responsibility to complete the transition of empowerment from theory to practice, let us look at the significant role of leadership as it relates to developing and maintaining high-performance organizations and empowering its employees.

1. The Need for Effective Leadership

As our society progresses beyond the industrial revolution to a more global economy, the work environment has become increasingly more complex, chaotic, and uncertain. The control-oriented, management-driven structures of that foregone era are

becoming outdated and obsolete. A new paradigm has emerged that exploits the knowledge of front line employees by offering them responsibility to make decisions that affect the organization (Kouzes & Posner, 1995). This sweeping change in organizational dynamics requires the competent participation of reliable employees, but more importantly, it requires the complete confidence, acceptance, and endorsement of that participation by those in positions of leadership within the organization. In order to produce truly effective, high-performance organizations, new leadership approaches must emerge that differ from the old management practices.

It is important to note that leadership and management are two fundamentally different, though complementary systems of action. Both are necessary for organizations to survive in this increasingly complex business environment, however, effective leadership is what is needed to catapult organizations functioning in complex, chaotic, and uncertain task environments, to greatness (Kotter, 1990).

a. Management: Coping With Complexity

John Kotter (1990), a professor of organizational behavior at Harvard Business School, postulates that the management function focuses on coping with complexity. By complexities, he is referring to the practices, procedures, and processes that are necessary in the operation of an organization. Effective managers bring order and stability to an organization that is operating in a complex environment. Although effective management is necessary, organizations will not be able to survive in the new complex *and* volatile business environment if effective leadership is not also present that can adjust to these factors.

b. Leadership: Coping With Change

By contrast, Kotter (1990) describes the practice of leadership as coping with change. Today's business world is volatile, competitive, and uncertain. This requires organizations, constantly affected by rapid changes in technology and practices, to adapt in order to survive. Since major changes are necessary to survive and compete successfully in the new environment, effective leadership is needed to increase organizational productivity.

2. Types of Effective Leadership

Modern day behaviorists, consultants, and businesspersons have identified leadership techniques that recognize the value and strength of employee participation. These techniques are generally categorized as SuperLeadership or Transformational Leadership practices that emphasize the role of raising the level of awareness, activity, and responsibility of followers such that they become leaders, decision makers, and integral members of productivity within organizations (Burns, 1978).

This concept is especially important today, because of the increased complexity in the task environments in which organizations operate -- whether business or public sector. If leaders are dedicated to tapping into the vast potential within each individual, they can develop exceptional self-lead followers, who are dedicated to achieving excellence. Super-Transformational-type leadership offers the best utilization of human resources to effectively meet organizational objectives in task environments that are complex, chaotic, and uncertain (Manz & Sims, 1991).

This new model of leadership differs from traditional models in sources of power and influence, organizational direction, as well as leader and follower behaviors. In the new model, power is shared between leaders and their followers; either entity can have significant influence on decision-making. A leader's wisdom and the organization's direction build on the input, suggestions, and ideas of the followers, instead of directive one-sided initiatives in the command-and-control model. A leader's responsibility changes from controlling the organization to developing followers into leaders, promoting self-leading teams, and creating positive thought patterns to encourage decision-making. This type of work atmosphere increases followers' commitment to the organization based on feelings of value and ownership. (Manz & Sims, 1991).

Hence, the Super-Transformational style of leadership has emerged as the most effective approach to leadership, especially within complex organizations. It involves leading others to lead themselves, or influencing others to make decisions on their own to meet certain organizational goals. Along with this new way of thinking about leadership, a new measure of a leader's strength also exists: it is one's ability to maximize the contributions of others through recognition of their right to guide their own destiny, rather than the leader's ability to bend the will of others to his or her own (Manz & Sims, 1991).

3. Results of Effective Leadership

If effective leadership is necessary to compete in the increasingly complex business market, and leadership styles that elicit employee participation are emerging as the style deemed most effective in organizations, then it is necessary to research the results of organizations that employ this approach to leadership.

a. A Model of Effective Leadership

In their quest to develop a model of the characteristics of effective leaders, Kouzes and Posner (1995) conducted research, compiling case analyses and questionnaires given to thousands of individuals in leadership positions, who told their personal-best experiences. The resulting model included five fundamental practices of exemplary leaders. The most significant of the five practices, according to Kouzes and Posner, was "enabling others to act" – which means empowering subordinates.

Their research findings were consistent with what is argued to be the new approach to leadership within modern organizations competing in a complex environment. Most of those interviewed reported that leadership is a team effort and that exemplary leaders elicit the support and assistance of all those who must make the project work. Leaders must involve all those who have to live with the results of a major decision or change to foster a sense of ownership and commitment to that decision or change. Therefore, truly effective leaders enable others to act not by hoarding the power they have but by sharing it with their followers. Kouzes and Posner (1995) end their description of the "enabling" principle with the statement, "When people have more discretion, more authority, and more information, they're much more likely to use their energies to produce extraordinary results" (p. 12). This research confirms the concept that effective leadership yields empowered individuals who, together, can lead the organization towards extraordinary or high-performance results.

b. Effective Leadership Yields Empowerment

Warren Bennis (1991), theorist and author of the book *Leaders*, spent five years conducting research for a book on leadership. In that time, he interviewed ninety of the most effective, successful leaders in the nation in private industry and the public sector. Through observation, conversation, and extensive studies, Bennis identified

competencies common to successful leaders and classified the output, or the total effect of leadership, as empowerment. He defined empowerment as the feelings of significance, competence, identity, challenge, excitement, and stimulation that workers feel because of effective leadership.

If leadership theory purports that leadership is important and necessary for organizations to operate successfully and to achieve high goals, then based upon the principles presented above, those who have demonstrated truly effective, Super-Transformational-type leadership develop *empowered* subordinates. These employees are skilled, motivated, responsible, and then enabled to participate in the decision-making processes of the organization, in order to produce highly effective, high-performance organizations, especially in the midst of complexity and volatility.

C. EMPOWERMENT DEFINED

Most modern thinkers agree that empowerment is critical in improving productivity and results, yet many managers do not really know what empowerment is or to whom it pertains. Eager organizations often accept the empowerment phenomenon without full understanding, and hastily institute unsuccessful and unproductive "empowerment programs" (Ritchie, 1997). In this section, the intent is to provide a detailed explanation of empowerment theory in order to develop a strong understanding of the term "empowerment" and its implications.

1. Formal Definitions of Empowerment

Empowerment has been interpreted and employed in several different ways. There is substantial literature on the positive implications of social, religious, community, and economic empowerment, among other forms. However, for the purposes of this research, worker or employee empowerment will be the sole focus. Yet, even within the employee empowerment literature, there are myriad forms, contexts, and dynamics that influence the perception of employee empowerment (Foster-Fishman & Pennie, 1998). Multiple meanings and desires for empowerment emerge and significant differences exist between employees' and leaders'/managers' interpretations of this concept. Listed below are the concepts of empowerment that are most applicable to this perspective in establishing a working definition for the term.

It means giving the most-junior employees the authority to make decisions about customer complaints, so that they can be handled on the spot rather than by working through some bureaucratic channels. It means allowing subordinates to solve internal problems without asking permission, so that they are corrected before they have the time to get worse. It means giving managers the luxury to think through long-term issues and assist those empowered to learn and improve, rather than direct each worker's day-to-day activities (Sirkin, 1993, p. 58).

Empowerment means self-direction, allowing people to participate in the decisions that affect them. It is a move from the conventional form of management to a transformational form of leadership (CBCA, 1996).

To empower means to give power to. Power, however has several meanings...power means authority, so that empowerment can mean authorization. Power may also be used to describe capacity...However, power also means energy. Thus, to empower also can mean to energize (Thomas & Velthouse, 1990, p. 667).

"...empowerment is a state of mind as well as a result of position, policies, and practices" (Block, 1987, p. 64).

The more common definitions of participation include influence sharing, joint decision making, and the degree of employee involvement in decision making...employee participation, involvement, and empowerment are essentially the same process (Shadur, Kienzie, & Rodwell, 1999).

Each of these definitions of empowerment reflects that leaders/managers recognize the worth and knowledge of their employees and get them involved in the operation of the organization by giving them the authority to actively participate in the decision making process. Thus, it capitalizes on the employees' perceptions of influence and feelings of ownership within the organization and generates improved organizational procedures.

2. Characteristics of Empowerment

Though the formal definitions of empowerment have been presented above, the specific attributes of truly empowering organizations have gone undisclosed. Empowerment is a powerful notion, and because of this, it results in multiple effects. Organizations that implement empowerment strategies experience effects on their employees, managers, and on the overall performance of the organization.

a. Effects on Employees

When leaders/managers empower their employees, the employees become more active in the organization because they are given the authority to make decisions and provide input into the operation of the organization (Sirkin, 1993; Shadur, Kienzie, & Rodwell, 1999; Thomas & Velthouse, 1990). As a result, employees make more informed, better thought out decisions that usually increase organizational performance (CBCA, 1996). This new level of involvement creates an excited energy within the employees that allows them to maintain a level of enthusiasm in completing their work tasks (Kouzes & Posner, 1995; Thomas & Velthouse, 1990) and generates feelings of belonging, self-worth, ownership and pride, which result in the employees' best efforts (Kouzes & Posner, 1995; Thomas & Tymon 1993).

b. Effects on Managers

Realizing that those closer to the situation are best prepared to handle it appropriately, empowering managers give their employees the authority to make decisions on the issues that they face at their level. Delegating decision-making to lower levels reduces the amount of time in the decision-making process and produces more effective decisions (Sirkin, 1993). When the managers loosen their control, they allow the employees to have more freedom of activity, while at the same time, freeing themselves from the chore of screening and completing the work tasks of employees levels below them. No longer constrained by the bureaucratic ties of the command-and-control management paradigm, managers have more time to address forward-thinking issues (Kouzes & Posner, 1995; Sirkin, 1993). Again, this is a more productive use of the organization's human resources, which results in increased performance.

c. Effects on Organizations

When managers empower their employees with the authority to make important decisions that effect the organization, the result is usually more effective decisions and reduced time in the decision-making process; both valuable gains to the organization (Sirkin, 1993). Additionally, when the manager allows problems to be handled at the lowest level possible, it frees up those at higher levels to concentrate on higher-level problems that require their time. Thus, employing empowerment is the most

effective use of the organization's human resources. Finally, empowering subordinate employees creates an enthusiasm, excitement, and energy within the employee corps that allows them to experience feelings of acceptance, ownership, and pride in the organization that usually causes the employees to give their best effort (CBCA, 1996; Kouzes & Posner, 1995; Thomas & Tymon, 1993). The result is an increase in overall organizational performance.

D. THEORETICAL MODEL OF EMPOWERMENT

As noted above, there are many different definitions, models, and interpretations of the term "empowerment." However, for the purposes of this research, the Thomas-Tymon Model of Empowerment will be used. This model of empowerment provides a basic structure that can be used to evaluate individuals' feelings of empowerment as they relate to completing assigned tasks (Thomas & Tymon, 1993; Thomas & Velthouse, 1990). Because it was designed for such a purpose, this model will be key in supporting the theoretical framework from which the analysis of this research topic will be based.

1. An Interpretive Approach

This model uses an interpretive approach to considering empowerment in that, instead of observing just the external situational attributes (i.e., leader's behavior, job characteristics, etc.) that may affect empowerment, this model focuses on the incumbent cognitions (internal perceptions) of those attributes (Thomas & Velthouse, 1990). Concentration is on the psychological aspects of the empowerment process; observing and evaluating what an individual's mental and emotional attitude is as it relates to the external conditions and events. In other words, the Thomas-Tymon-Velthouse Model of Empowerment explores an individual's perception about the nature and magnitude of his or her authority to participate in the decision-making process within the organization.

This perspective is consistent with other theories that present empowerment as a psychological *state of mind* (Block, 1987) or a *mental perception* of participation (Shadur et al., 1999), vice just an external set of factors that supposedly "cause" empowerment to happen. It is important to evaluate the perceptions and feelings of individuals to discover the true value of empowerment. It does not matter what type of empowerment program is adopted, how many organizational initiatives are created, or whatever other external conditions may exist; if the individuals the organization seeks to empower do not *feel*

empowered, than the approaches to establish empowerment will be unproductive and unsuccessful -- perception is reality.

2. The Thomas-Tymon Model of Empowerment

According to Thomas and Tymon (1993), "people feel empowered when they are energized by the tasks they perform" (p. 8). Feelings of empowerment bring a sense of "excitement, vitality, and enthusiasm" about their assigned tasks. Furthermore, they postulate that empowered individuals really enjoy what they are doing and put their best effort towards successfully accomplishing their tasks. Conversely, individuals who do not feel empowered are uninterested in their tasks and are unproductive. In the Thomas-Tymon model, empowerment was divided into four dimensions each representing an attitude or perception with respect to a specific task: choice, competence, meaningfulness, and progress. The Thomas-Tymon Empowerment Inventory evaluates the feelings of empowerment in these four specific task assessment areas.

3. Feelings of Empowerment

Graphically depicted in Exhibit 2.1, the theoretical model of empowerment describes four feelings of empowerment experienced when individuals are given a specific task. In the model, the two rows represent feelings about the task *activities* and the task *purpose* (i.e., how does the individual feel about the types of actions that are required to complete the task and what is the individual's attitude about completing the task). The columns correspond to the sense of *opportunity* and *accomplishment* (i.e., how does the individual feel about the chance to participate in that particular manner and what is the individual's attitude about successfully accomplishing the task). Four specific feelings or mental perceptions of empowerment emerge from combinations of the above factors (Thomas & Tymon, 1993).

a. Feeling of Choice

The feeling of choice is the *opportunity* an individual feels in selecting certain *task activities* that make sense to him/her and to perform the tasks however he/she sees fit. It is a feeling of being free to use your own judgment to make decisions and choose whatever course of action you feel is necessary. Said another way, individuals

who are given decision authority, execute self-determination, and control their own destiny most likely experience feelings of choice (Thomas & Tymon, 1993).

b. Feeling of Competence

The feeling of competence is the *accomplishment* an individual feels in skillfully and successfully performing *task activities* upon which he/she chooses to act. Competence involves the sense that you are well trained and prepared to do good, quality work on that task (Thomas & Tymon, 1993).

c. Feeling of Meaningfulness

The feeling of meaningfulness is the *opportunity* an individual feels when he/she believes that they are performing a worthy *task purpose*. It is the perception that you are on a valuable mission and that your actions matter in the larger scheme of things. Individuals who can see the "big picture" and can identify the importance of their actions to the entire organization experience feelings of meaningfulness (Thomas & Tymon, 1993).

d. Feeling of Progress

The feeling of progress is the *accomplishment* an individual feels in achieving the *task purpose*. It involves the belief that the individual's actions are accomplishing something and that the task is actually progressing (Thomas & Tymon, 1993).

Overall, this model describes four essential feelings or perceptions that should be present for an individual to feel empowered, each substantiated by academic research and theory. Therefore, if theory suggests that empowered individuals are more productive in their task accomplishment and significantly contribute to overall organizational performance, then it should also stand that in order to achieve the same results, employees need to experience feelings of choice, competence, meaningfulness, and progress, as described above. This model will be the basis of future analysis in this research paper.

E. FUNCTIONAL DEFINITION OF EMPOWERMENT

The discussion above has presented multiple definitions of empowerment, the relationship between empowerment and leadership effectiveness, the predicted effects of empowerment and a research-based model characterizing the dimensions of empowerment as an individual interpretation of a given task environment. These factors are merged below into a functional definition of empowerment that will be used for this thesis research:

Empowerment: Enabling subordinates in such a manner that they perceive that they have the authority (choice) and ability (competence) to make important decisions (meaningfulness) and to determine the effect of those decisions (progress) on their personal livelihood, the livelihood of anyone within their sphere of responsibility, or the operation of the organization as a whole, resulting in an overall high level of performance for the entire organization.

F. IMPLEMENTING EMPOWERING PRINCIPLES THROUGH EFFECTIVE LEADERSHIP

Most executives want to achieve the powerful results that empowerment can produce. In the business world, those results are greater customer satisfaction, reduced costs, faster and better decision-making, improved pricing, and an increased market share. However, most organizational leaders do not know how to achieve true empowerment in their organizations (Sirkin, 1993). Consequently, they formulate an inadequate empowerment program and attempt to implement ineffective initiatives; but all to no avail.

If these eager executives do not institute procedures that increase the feelings of empowerment among their employees, then the powerful results that empowerment can produce are probably unlikely. Based upon the research discussed above, true feelings of empowerment are the products of effective leadership.

There are multiple meanings and desires for empowerment that emerge between employees and leaders, and there are several forms, contexts, and dynamics that influence employee empowerment (Foster-Fishman & Pennie, 1998). However, according to Harold Sirkin (1993) of The Boston Consulting Group, those organizations that have been most successful in implementing empowerment programs have all experienced effective leadership in the following ways:

1. Vision

The leadership of the organization established a well thought out and sincere vision for how the organization would perform, utilizing empowering principles. In order to do that, the senior management had to first put themselves in the shoes of those to be empowered, because it would be impossible for an empowerment program to work unless the senior management understands the perspective of the lowest employee (Sirkin, 1993). Senior management can "put themselves in the shoes" of their subordinates in several ways, but none as simple as asking their opinion. The result of a well-established vision that includes the perspective of low-level employees is a collaborative relationship between management and employees where cooperative goals are promoted and trust is built (Kouzes & Posner, 1995). An effective vision also ensures that members of the organization understand the importance of their role (meaningfulness).

2. Training and Resources

If subordinates are going to be given the responsibility to make important decisions that could affect the entire organization, then practical training should be made available that will teach them how to make effective decisions. Additionally, employees need to be provided with all of the resources necessary to solve problems and they need to receive training on how to interpret and utilize those resources. Delegating decision-making will not work unless employees have the correct information, resources, and training, thereby developing competence in their assigned tasks (Sirkin, 1993; Thomas & Tymon, 1993).

3. Trust

All organizations that were implementing successful empowerment initiatives actually delegated authority to their employees and allowed them to make real decisions. These actions increase the feelings of choice and meaningfulness, within individuals, and therefore increase feelings of empowerment (Thomas & Tymon, 1993). However, releasing control, offering operational freedom, and actually delegating authority to subordinates requires leadership to trust their employees and the system. At the same time, the employees have to also trust that leadership will not punish them for exercising initiative and their freedom of choice (Sirkin, 1993). If the employees have been

adequately trained, few significant problems should arise through poor decisions made at junior levels.

G. IMPLICATIONS ON ORGANIZATIONAL PERFORMANCE

Through this entire chapter, significant theoretical arguments have been presented that employee empowerment leads to high performance organizations, but without much substantiated evidence. There are, however, literally hundreds of organizations that subscribe to the empowerment notion and have benefited greatly from its effects. Crosby (1992), an expert in group and organizational dynamics and founder of the Leadership Institute of Spokane (LIOS), conducted research on over 500 U.S., Canadian, and British organizations. He found that when empowerment is appropriately implemented, it does increase productivity. Through his extensive research, he affirms that:

The creation of an empowered and high performance organization is dependent on several factors [employee influence, timely decision-making, job clarity, person-task fit, individual authority, resource availability, big-picture perspective, good training, positive reinforcement, etc.]...When these factors are attended to, productivity and quality are high, absenteeism is low, accidents are reduced, and employees are more likely to enjoy and be motivated in their work environment (Crosby, 1992, p. 2).

Crosby's findings can be interpreted in two ways. First, he considers empowered and high performance organizations to be synonymous, therefore an organization that implements empowering principles (an empowered organization) would become a high performance organization as a result of its empowered employees. Secondly, empowered/high performance organizations are the result of the positive work attributes of their employees (i.e., increased productivity and quality, increased motivation, etc.), which in turn are the results of feelings of empowerment experienced by the employees.

Employee empowerment does work. It increases employee involvement, activity, and participation in the workplace, which also leads to increased organizational performance. Additionally, empowered employees take ownership of their work, feel like they are a part of the "grand scheme" of things, and, therefore feel responsible not just for their job, but for making the whole organization work better. Individuals and teams alike are constantly working together to achieve higher levels of productivity within an empowered organization.

Empowerment only fails when leadership/management does not want to take the necessary steps to ensure empowerment becomes a reality in their organization. Failure comes as a result of either a resistance to change, lack of trust in their subordinates, or fear of losing their jobs due to excessive productivity by subordinates (Crosby, 1992).

H. ASSESSING THE EMPOWERMENT PROCESS

To this point, all of the information in the chapter has been presented to establish the background for the theoretical framework that will be used for assessment of the empowerment process in later portions of this research paper. Exhibit 2.1 is a graphic representation that synthesizes the theoretical concepts presented above to provide a framework for the empowerment process.

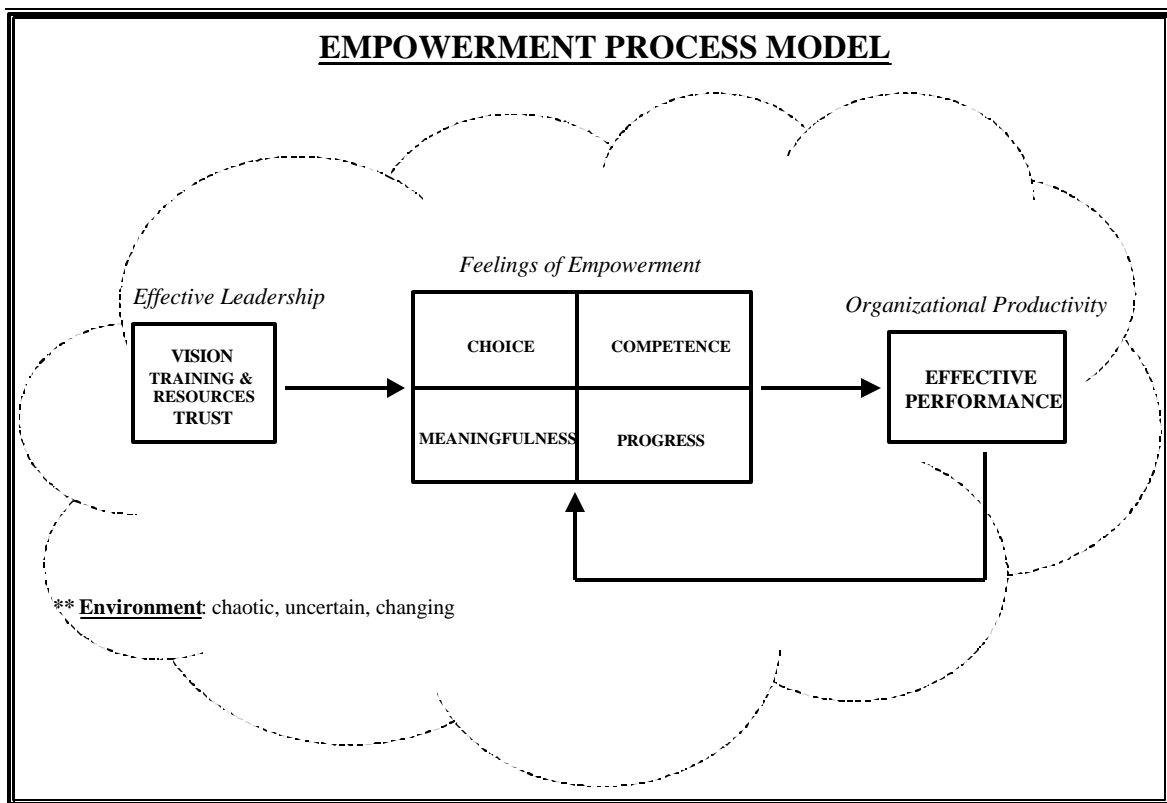


Exhibit 2.1

1. Environment

Modern society continues to progress beyond the industrial revolution to a complex, chaotic, and uncertain global economy. Due to the complexity of the environment, control-oriented, management-driven structures will no longer be applicable, but new concepts of organizational administration will need to be adopted. The new paradigm of empowerment has emerged that exploits the knowledge of front-line employees to produce effective, high performance organizations within this chaotic environment. However, new leadership approaches need to emerge to ensure its effective implementation. In Exhibit 2.2, the dotted cloud that surrounds the systems diagram characterizes the environment.

2. Effective Leadership

Surrounded by volatility, competitiveness, and uncertainty, organizations are constantly changing to adapt, survive, and compete successfully in the new environment. Super-Transformational Leadership-type styles have emerged as most effective in coping within this organizational context. These styles recognize the value of subordinate knowledge and experience. The leadership's challenge is to raise the level of awareness, activity, and responsibility of its followers such that they become leaders, decision makers, and integral members of organizational productivity. Seeking to empower employees with greater participation and decision authority, effective leadership formulates a viable plan by establishing a sincere vision, and implements an effective plan by providing adequate training and resources, as well as trust in their employees. When this is done correctly, the result of effective leadership is empowerment.

3. Feelings of Empowerment

Empowerment is enabling subordinates to believe that they have developed the competence and have been granted the choice to make meaningful decisions that affect the organization, so that their decisions will result in feelings of progress and an increase in overall organizational productivity. In other words, due to effective leadership, the employees of an empowered organization feel energized by their ability to participate in the problem-solving and decision-making processes of the organization. The result is an

increase in organizational performance through employees who possess a sense of ownership and make valuable decisions.

4. Organizational Productivity

Increased organizational productivity is merely the manifestation of empowered employees. Employees who are more involved in the processes of the organization experience feelings of elation that excite them to work harder, smarter, and better, increasing the overall performance of the organization. Improved productivity returns to the system (empowerment process) in the form of feelings of progress based upon knowledge of success, increased employee trust (choice), validated competence, and a sense of pride in the opportunity to contribute in a positive manner (meaningfulness).

5. Theoretical Framework

Today's organizations are operating in a complex, volatile, uncertain environment, which requires effective leadership to cope with the changes within the environment. Effective leadership yields empowerment, which in turn generates increased productivity, leading to highly effective organizations. Increased organizational productivity adds back to the positive feelings of empowerment through knowledge of progress, validated competence, increased confidence in choice, and pride in the task accomplishment.

I. APPLICABILITY TO MARINE CORPS WARFIGHTING

In the previous section, the theoretical framework for this thesis was established based upon a substantial literature review of principles, theories, and prior research applicable to civilian organizations that operate in an environment of complexity, chaos, and uncertainty. When conducting warfare, military organizations, specifically the U.S. Marine Corps, operate in an extremely hostile environment characterized by the same environmental attributes of complexity, uncertainty, and chaos. I submit, then, that the principles of this model can also be applied to military organizations.

Even though the business leaders in today's industrial market have recently discovered the advantage of empowering employees to make decisions that will improve organizational performance, the military has long entrusted subordinates with battlefield decision-making. In the Marine Corps, delegation of authority to and semi-autonomous operations by subordinates [within the commander's intent (vision)] are commonplace.

Likewise, the Marine Corps desires effective performance among its units to bring about successful mission accomplishment – high performance. Therefore, if the empowerment strategies employed by civilian organizations functioning in similarly complex environments can be analyzed and evaluated with a model such as the one presented in this chapter, then the Marine Corps’ warfighting practices, as an organization that possess like-qualities and embraces the same goal of “high performance, can also be examined by the same model. Doing so would accomplish one of the objectives of this research, which is to apply the principles of the empowerment process model developed in this chapter to analyze and assess the Marine Corps’ warfighting practices as it operates within the complexities of a precarious environment.

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III. INFORMATION TECHNOLOGY

A. INTRODUCTION

Like it or not, we are all members of a rapidly maturing information society; a modern culture where technology is advancing quicker than we can even apply it. People within this hi-tech society are engaged with computers and information technology in their homes, at school, on the job and other institutions, and use these capabilities for work, as well as leisure purposes. Today, computers are a part of just about everything that we do and computing chips are in nearly every piece of equipment that we use. We use information technology and we like it, because it enables our lives. Assisting in nearly every facet our lives, it allows us to do more, better, faster, and easier.

In this chapter, background information provided is obtained from an extensive literature review that defines the concept and applicability of information technology (IT) and how it can affect organizational dynamics. I explain what IT is, how IT has emerged as a dominant and necessary resource, how IT systems are currently being implemented, what the potential is in future utilization of these tools, the implications of extended implementation, and possible applicability in military warfighting.

B. THE TECHNOLOGICAL REVOLUTION OF THE INFORMATION AGE

Modern industrial societies are currently undergoing a revolution in computing technology that is changing the way that businesses operate and affecting the way that the people of those societies live, act, and think. The proliferation of new technologies and concepts during this revolution are the effects of functioning in the Information Age, and have transformed these societies into Information Societies that focus on the management of information as the central focus to nearly every issue that the society faces: vocationally, socially, educationally, and psychologically (Long & Long, 2000).

1. The Information Age

Throughout the ages, the vocational system of a society has affected the way that the people of that culture think and live. In other words, the system that governs the commercial aspects of a culture affects the organization, attitudes, transactions, and other social aspects of the people who take part in it. Each period of modern history has been

defined by some central resource, critical to the vocational/commercial system that enabled the livelihood of that civilization. Consequently, the society adopted social and psychological beliefs that were based upon the factors necessitated by the essential, central resource (Barrett, 2000). Thus, a shift in the vocational system would cause a corresponding shift in the psychosocial factors that affect the people of that society.

Take, for example, the progression from an agrarian society to the emergence of a society existing during the Industrial Revolution. At one time in western history, agriculture and produce were the central resources in established agrarian societies. Since the livelihood of the people within those societies was based upon what could be produced from the land, procedures for distributing, cultivating, and harvesting the land and trading produce were incorporated into their normal lives (i.e., family structure to necessitate farm hands, observing the sun-up to sun-down work day, farming and trading for personal subsistence, etc.).

Years later, the western world entered the Industrial Revolution, experiencing a technological revolution in equipment, techniques, and procedures that fundamentally changed the way that people lived. With the focus shifting from farming and agriculture to mechanical machines, the Industrial Revolution brought about a substantial shift in the concentration of human habitation towards industrial bases; time-centered establishment of the work day into shifts since machines could work at all hours of the day; and new-found expectations of employees to work for the productivity of a company vice for their personal subsistence³. In both cases, cultural attitudes were shaped by work tasks and work design, which were a direct result of the vocational system of the society. A shift in the primary vocational system of the society altered the way of life of the people who lived within the society.

Today, modern western societies are in the midst of another shift in vocational focus to one in which information is the primary, essential resource. These societies have entered the Information Age, where technological advances greatly affect the way that people think, live, and act. The Information Age has brought about an increase in the importance of information as the central source of wealth and power (Fogarty, 1997; Long & Long, 2000; West, 1999). Therefore, functioning in this Age requires a

³ Information obtained from on-line sources: *History: From the French Revolution to 1945*. Available: www.france.diplomatie.fr/france/histoire/hist03.gb.html; and *The Industrial Revolution (1700 - Present)*. Available: www.neo-tech.com/businessmen/part6.html.

paradigm change that focuses on managing information instead of agriculture or mechanical systems. The emphases today is on faster, better, and easier means to the ends, whether in business, educational, or domestic issues.

2. The Information Society

Today, the industrialized societies that are experiencing the wide and rapid technological revolution of the Information Age, are said to be Information Societies; societies where innovations in computing technology have emerged in nearly every facet of life. A large number of members of these societies use computers regularly, are interconnected through networks, or have some sort of contact with other computing equipment that makes their lives easier (e.g., ATM bank tellers, microwave ovens, digital map systems, etc.); they are considered *knowledge workers*. A knowledge worker is any one whose job or lifestyle entails the use, manipulation, and dissemination of information (Long & Long, 2000).

Within the information society, people enjoy the advantages of a simpler life enabled by technology, perhaps without even realizing that it has changed their psychosocial perception of life -- it has changed the way that people think, live, and act in the world around them. The vocational shift from a machine-centered society to an information-centered society has created people whose lives' are focused on gathering and manipulating information. Now, it is a way of life. So how will this shift in thinking affect processes within an information society?

3. The Information Technology Revolution

The Information Technology Revolution has produced several enabling technologies that have advanced and improved the common manner of performing tasks. The cornerstone of this revolution is the computer with its high-speed processing ability, capable of manipulating hundreds of streams of data in hundredths of seconds. The use of computer systems, information processing applications, presentation tools, information resources, and networking tools has increased productivity within the society. Planned appropriately, the power of advancing information technology (IT) can be harnessed to radically improve the processes that make organizations function more efficiently. Proper implementation of IT can improve an organization's performance and give the

organization an advantage in a volatile work environment, by exploiting its speed in operations and decision-making.

C. INFORMATION TECHNOLOGY CONCEPTS

It is important to understand what IT is before current implementations, projected benefits, and possible implications on organizational dynamics can be discussed. According to Long and Long (2000) in their most recent publication *Computers*, information technology (IT) refers to "the integration of computing technology and information processing" (p. 4). The technological advances of these two components are what have made IT such a valuable resource.

1. Information Processing

Data is raw input that is accepted by a system; they are facts and figures in audio, visual, and alphanumeric forms. Information is data that has been collected and processed into meaningful form. Therefore, information processing is the actual procedure of manipulating raw data into an output that can be used to make important decisions in future situations. Since 1950, modern industrial societies have attempted to mechanically collect, sort, summarize, exchange, and process information; but not until the advent of computers did we begin to tap into the full potential of information (Long & Long, 2000). Now, organizationalists realize that information processing capabilities can be used to make more informed decisions in the future, leading to increases in organizational productivity.

In the Information Age, information is just as critical a resource as money, material, or people. Therefore, managers must understand the potential of good information on their organization's performance. Since information processing is only as valuable as the quality of data available, managers must also be cognizant of the input. In order to be useful, produce meaningful results, and reach its full value, information must be accurate, verifiable, complete, timely, and relevant. Only then will an organization achieve the full advantage of information processing (Long & Long, 2000).

2. Computing Technology

Computing technology refers to the advanced concepts applied to equipment that processes information. Computers are good at digesting data and producing information

and have been the cornerstone of the technological revolution. They are designed to handle logical, mathematical, and numerical manipulation of hundreds of streams of data to bring about an accurate and timely response, thus enabling more efficient performance of common functions. Additionally, computing systems perform four basic functions that allow users to exploit their capabilities: input, output, processing, and storage (Long & Long, 2000).

3. Information Technology Defined

Based upon the explanations above, information technology is defined as the concept of integrating advanced computing technology with information processing to improve efficiency of performance. Using the latest advances in technology, IT systems take in data (input), manipulate the data to provide meaning to it (process), possess the ability to present the information in some useable and relevant form (output), and store the results for potential use during future situations (storage). This is a much more efficient means of conducting business, by reducing the time it takes to make decisions based upon the available data.

A form of process management and process improvement, IT implementation focuses on the efficiency of operations; on the means, rather than ends. Information technology systems can be used as management tools to help manage complexity. Particularly in the business world, as processes get more difficult and data continue to be abundant, advanced IT systems will be needed to improve organizational performance. The new management paradigm brought about by the Information Age focuses on IT implementation: gathering, processing, managing, and utilizing information to bring about better operational decisions through the technical innovations in equipment

D. IMPLEMENTING *IT* THROUGH INTEGRATED INFORMATION SYSTEMS

For the past 20 years, companies that have invested heavily in IT have generally shown a steady rise in profitability. In 1997, global companies spent \$782 billion on IT, including hardware, software, networking equipment, technical support, and training, and while the figure is projected to rise to \$1.7 trillion by 2003. IT is the fastest rising corporate expense today, because global companies have realized that implementing IT through investing in integrated information systems increases organizational productivity

(Forbes, 1998). But what is it about IT that makes it so profitable? More importantly, what is an integrated information system and how does it lead to organizational productivity?

An integrated information system consists of two components: (1) *information systems* that collect, process and manipulate data into processed information and (2) *networking capabilities* that allow for the immediate sharing and exchange of information across functional, geographical, and organizational boundaries.

1. Information Systems

An information system (IS) is comprised of the hardware, software, data, people, and procedures that combine to create a valuable tool for increased organizational efficiency. The hardware is the computing equipment that houses the chips that enable the processing function, whereas the software consists of logical applications that actually perform the manipulation of the information. As explained previously, the value gained by automated information processing is dependant upon the quality of the input received. Therefore data are crucial elements of an IS. Furthermore, the people that use the system and the procedures that control it are also integral components of an IS. The system will not work properly without trained, skilled individuals who know how to program and perform the functions available from the IS (Long & Long, 2000). These are all critical factors in an IS and will directly affect the level of proficiency and efficiency with which the desired processes are performed.

The purpose of an IS is to conduct information processing and provide decision making assistance to its users. Much like the functions of a basic computing system, an IS receives input data, manipulates the data into information that can be used for problem solving, provides output in some meaningful format, and stores the results for future use. However, an IS specifically stores the processed information in some form of database, so that users can query the system and receive useable information to assist in making better, more informed decisions in problem situations. The output of an IS is usually in the form of a report (vice a random display of information) that assists the users in their decision making process.

2. Systems Integration: Networking

The true power of information systems comes by integrating multiple, independent entities together to expand the base of knowledge and share valuable information among the users. This can be accomplished by establishing a data communication network that joins several nodes that are physically separated from one another. Today, most existing computers are electronically linked to some form of local or wide area network to share information and resources. Through these networks, users have access to more information than is resident on their personal system, thus expanding their knowledge. An example of this concept would be the process that airline companies use to check availability of seating of flights against other requests being made around the world. This type of interaction and interconnectivity contributes to better, more efficient decision-making.

a. Network Functions

Data communication networks allow users who are physically separated to exchange and share information quickly and easily. It permits the immediate exchange of information across geographical, technical, and organizational boundaries (Tebbe, 1998). Additionally, networking provides ready access to information that was collected, processed, and stored by another system. Both functions are performed to achieve business benefit. In the present competitive business environment, decision makers need access to as much information as possible to improve organizational performance. Therefore, organizations are realizing that they must cooperate internally to take full advantage of company resources and information and they must cooperate externally to compete effectively (Long & Long, 2000).

b. Zero Latency

Extensive data communication networks require transmission media that can carry large amounts of data or information at high speeds. Advances in technology have allowed the establishment of high-speed communication channels to pass data and connect nodes throughout the world via wire, cable, and wireless media. Today, independent entities throughout the world can be connected and exchange information

with near zero delay enabling organizations to analyze corporate information and quickly make better, more informed decisions (Tebbe, 1998).

E. INFORMATION AND DECISION MAKING

The research summarized above suggests that implementing integrated information systems is beneficial to organizational performance. What makes information so valuable is the potential it possesses, when used correctly, to make quicker, more informed decisions. Improved quality and speed of decision-making is the power of information in the new era -- making decisions that affect the operation of the organization fast enough to beat opponents to the punch. Therefore, there is a positive relationship between receiving information and efficient decision-making. However, information has to be properly filtered and the correct type of IS has to be employed before an organization can experience positive results.

1. Information Filtering

Information filtering requires that "the right information [reach] the right decision maker at the right time in the right form" (Long & Long, 2000, p. B8). This is an important notion, because not all information is applicable or valuable to employees at all levels of an organization. Employees ought to receive just the information that pertains to their job tasks. Therefore, in order to use information correctly, it must be filtered to the appropriate level.

There are four levels of information activity within most organizations, each requiring its own set of needs. Automated IS process data at the Clerical Level and provide information for managerial decision making at the other three levels (Strategic, Tactical, and Operational). For the purpose of this research, I am most interested in the information requirements for decision-makers who operate at the Tactical Level.⁴

⁴ Long & Long (2000) refer to the "Tactical Level" as that level of information required by middle managers. For the purposes of this research, I am focusing on the use of integrated information systems used by intermediate-level, military decision-makers (middle managers), who lead/manage independent, semi-autonomous maneuver elements -- teams that are subordinate, but have the capability to operate independently of the higher organization. Since this level of information activity/decision-making is most applicable for this research, it must be noted that the military uses of the terms "Operational" and "Tactical" are opposite of the Long & Long definition.

Most middle managers or functional decision makers require information at this level. At the Tactical Level, managers must implement the objectives and policies made at the Strategic (highest) Level by identifying specific tasks that need to be accomplished. Managers require "what-if" reports that are generated in response to inquiries that depict scenarios from the proposed courses of actions to meet the strategic objectives. The information that is available at this level is rarely conclusive, meaning that the most acceptable alternative cannot be identified from the information alone. Most Tactical Level decisions will have to be made by personal intuition with the regards to the available information. The IS applications at this level are decision assistance tools, that help decision makers come up with the best courses of action (Long & Long, 2000).

2. Decision Support Systems (DSS)

Just as there are different levels of information activity, there are also different types of automated information systems that provide the information requirements for each level of activity. The correct information system must be employed at the appropriate level in order to achieve benefits from IT implementation. Data Processing Systems (Clerical level), Management Information Systems (Operational level), and Executive Support/Expert Systems (Strategic) all meet the basic tasks of an IS. However, Decision Support Systems (DSS) are the most valuable to middle-level managers/intermediate decision-makers and are most applicable to this research. When the terms "middle-managers" and "intermediate decision-makers" are used in a military context, they refer to the leaders of subordinate units that function as semi-autonomous components of a larger force and have the potential to maneuver, operate, and make decisions independently from the senior organization. DSS would be the type of information system that is most relevant for this level of functionality.

Decisions Support Systems are information systems that help decision makers in the problem solving process -- the system does not make the decision for the manager, because the information provided is usually inconclusive, although helpful. These systems are most useful at the tactical level of information activity and are designed to address semi-structured and unstructured problems. The problem is semi-structured because information regarding the situation can be obtained from the integrated database, yet unstructured because extenuating circumstances that surround the situation are unaccounted for and therefore uncalculated. The results of DSS are general-purpose

models, simulation capabilities, and other analytical tools that can answer "what-if" inquiries proposed by the decision maker. Additionally, the decision support tools are readily adapted to meet the information requirements for typically any decision environment (Long & Long, 2000). Thus, a DSS would be the appropriate type of information system to employ with quality information that is filtered for tactical-level employees.

3. Practical Example in the Current Information Society

There are many examples of how information systems have combined with decision making to result in effective performance in challenging work environments. However, the applications made by agencies within the emergency management

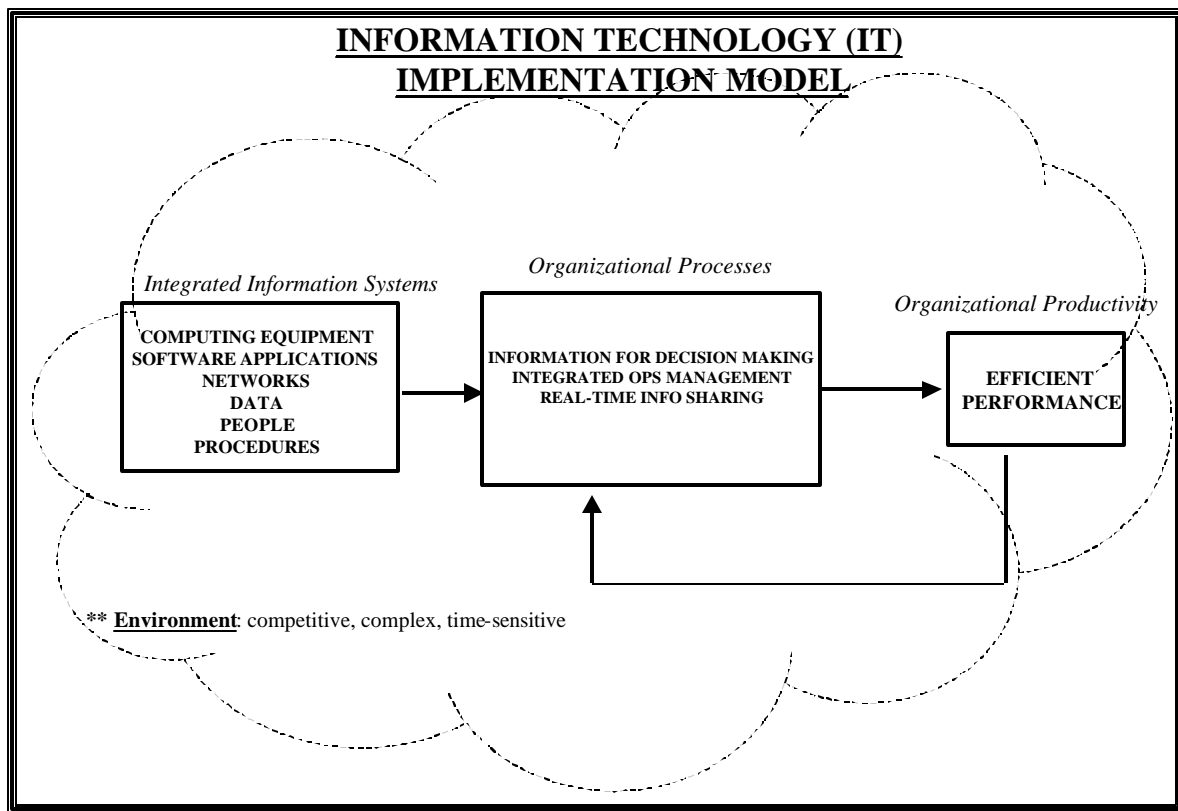


Exhibit 3.1

community are most relevant. Officials in the emergency management sector are seeking to integrate commercially available technologies in command, control, communications, and computing functions to become more effective during emergency and disaster relief

responses. Information technology is gaining momentum in this community by providing means for collaborative training, planning, mission rehearsal, decision making, information distribution and responses to crises (Robinson, 1997). These organizations are exploiting the advantages of IT, even in a chaotic, changing, uncertain environment. This same combination of information sources and information systems could be useful to organizations that function in similar task environments.

F. IMPLICATIONS OF *IT* ON ORGANIZATIONAL PERFORMANCE

To this point, all of the information in the chapter has been presented to establish the background for the theoretical framework that will be used to assess the implementation of IT systems in latter portions of this research paper. Exhibit 3.1 is a graphic representation that synthesizes the theoretical concepts presented throughout the chapter to provide a framework for the assessment of the IT implementation process.

1. Environment

In this the Information Age, technology is developing much faster than we can figure out how to use it. However, the technology that we are using and the manner in which we are using it have spurred a paradigm change in the psychosocial values of our culture. The vocational shift of emphasis from mechanical systems to automated information systems has changed the way that we think, live, and act -- it has become very much a part of our way of life. The influence of advancing information technology has allowed us to do more, quicker, better, and farther; it has increased our efficiency in accomplishing common tasks. With this increase in speed of operation and availability of information comes increased complexity in all facets of the society. Information technology systems, implemented properly, can be valuable tools to manage the complexities of organizational processes. Additionally, proper implementation of IT can improve an organization's performance by exploiting its speed in operations and decision-making. However, the same technological advantages are available to every other organization, which increases competition within the market. Therefore, organizations functioning in today's modern information society, must deal with the changes, complexities, and competition in this challenging environment.

2. Integrated Information Systems

Successful IT implementation starts with employing effective integrated information systems. In this model, an integrated information system consists of two components: (1) *information systems* that collect, process and manipulate data into processed information and (2) *networking capabilities* that allow for the immediate sharing and exchange of information across functional, geographical, and organizational boundaries. A basic information system is comprised of five independently significant elements (i.e., hardware, software, data, people, and procedures) the model depicts each element of the *IS* component separately, along with the *networks* component. Each component affects the performance of the integrated information system in some manner.

a. Computing Equipment

Computing equipment refers to the hardware that houses the processing chips necessary to handle logical, mathematical, and numerical manipulation of hundreds of streams of data to bring about an accurate and timely response. The quality (speed, interoperability, durability, and storage capacity) of this equipment will affect the performance of the integrated information system (Long & Long, 2000).

b. Software Applications

Software applications are the information processing tools. With regard to IS performance, good databases and decision support tools can help forecast otherwise unforeseeable events, meeting their task of providing assistance to decision makers in the decision process (Fogarty, 1997).

c. Networks

Networking capabilities are key to rapid information sharing and exchange between systems that are physically separated. Networking "knowledgeable" entities increases the amount of quality, real-time information made available to an organization's decision makers, regardless of their location.

d. Data

The information system is only as good as its input. Therefore, the data that the system takes in for processing should be high quality data (accurate, verifiable, complete, timely, and relevant).

e. People

The people who make up an information system include the users, technical support staff, and senior leadership. As *knowledge workers*, they should be comfortable with operating computing equipment; they are the "users" of the system. In order for these systems to work effectively, they should be administered and maintained by trained, qualified, and highly skilled technical IT support personnel. Furthermore, the senior leadership of the organization should give some thought to the liabilities their organization could face due to improper technology implementation.

f. Procedures

In order to implement an effective integrated information system, reliable user education and regular technical support procedures should be established. Users need to understand the capabilities of the systems so that they can employ the systems to their fullest potential. Additionally, the technical support staff needs to observe regular maintenance procedures to ensure proper systems operation.

3. Organizational Processes

The organizational processes include those factors that affect the operations and decision-making procedures of the organization. They are affected by organizational efforts to implement new initiatives that alter work tasks, and produce an effect on organizational productivity. If IT were really to improve the work tasks of an organization, according to Champy (1998), technology would provide the following:

a. Information for Decision Making

Effective integrated information systems would give managers enough information about their task environment so that they would have the courage to act; they would have the confidence to act because they would have the information they need to

make good decisions. Managers will be able to make better decisions if they actually know what is happening within the organization (Champy, 1998). Good software applications provide the type of information that helps them make better decisions (Fogarty, 1997).

b. Management of Integrated Ops

Networked systems would allow for the rapid sharing and exchange of information across physical and functional boundaries. Decision makers would be able to know what is happening between departments and functions, inside and outside of the organization in near real time. The employment of an effective integrated information system enables a "systems" approach to problem solving, where the results are timely reports that describe the corresponding effects of a decision made in one area of the company on other sections of the company. Managers and senior leaders need to have knowledge of what people in the organization are experiencing at a given time, if they are to make well-informed decisions that are beneficial to the organization.

4. Organizational Productivity

The end result of improved organizational processes, prompted by successfully integrated information system employment, is an increase in organizational productivity; that is, an overall increase in the speed of operations and enhanced decision making ability for the organization. In today's operating environments, "speed is life." In order to gain a greater market advantage, organizations invest in IT systems that emphasize the speed in converting data to decisions, thus increasing the tempo of operations and problem solving (West, 1999). Accelerating decision-making has always been the "holy grail" of computing for organizations.

Efficient organizational performance is a direct result of conducting process improvement techniques. Many organizations attempt to improve organizational processes by implementing and integrating IT. Remembering that a "high performance" organization is one that is successful at meeting its corporate objectives in a complex, competitive, and rapidly changing environment, an organization that focuses on developing and maintaining efficient performance in that type of environment can also be considered a "high performance" organization. Through attempting to improve processes

with IT systems, an organization can increase the rate at which operations are performed and decisions are made, resulting in "high performance."

5. Synthesis

Senior leaders within organizations have realized that they must take full advantage of IT to improve the performance of their organizations within today's challenging commercial environment. Many organizations have increased their investments in IT because it is helpful in improving the management of the organization's complex work functions. Therefore, since management is described as "coping with complexity" (Kotter, 1990), IT can be considered a management tool that can help organizations perform more efficiently within complexity.

6. Theoretical Framework

Today's organizations are functioning in a complex, competitive, and rapidly changing environment that requires improved management techniques to bring order to their operations in the midst of chaos. The complexities of the environment can be better managed by implementing viable IT systems. Correct IT implementation yields improved organizational process that, when properly executed can affect organizational productivity in a positive manner (i.e., successful use of integrated IS yield relevant/quality information used to generate more informed decisions based upon real time data from all areas of the organization, resulting in efficient organizational performance). Consequently, the increase in organizational productivity, manifested as efficient performance, affects the way organizational processes are executed in the future (process improvement).

G. APPLICABILITY TO MARINE CORPS WARFIGHTING

The model of IT implementation presented above, based upon principles, theories, and research obtained from an extensive literature review, is a representation of how corporations that function under competitive, complex, and rapidly changing market conditions have exploited IT to increase productivity and gain a market advantage. When the military is engaged in warfighting, it is operating in a volatile, competitive, complex environment, analogous to a corporation functioning in its competitive market. Can the principles of the IT Implementation Model abovementioned be used to assess the

military's utilization of IT tools during warfighting? Given the similarities of environmental conditions, I submit that the same principles apply to both types of organizations.

In the modern industrial world, organizations now recognize the potential of IT, understand the need to utilize it to stay competitive, and realize the necessity to exploit it to gain an advantage. Furthermore, the civilian sector recognizes a need to elevate technology planning to an equal level with strategic and financial planning in order to be successful in the future (Robinson, 1997). Thus, due to advances in IT, the United States has opened a commercial gap on the rest of the world that has allowed American businesses to flourish in a competitive global market (West, 1999).

The military, like all other facets of the modern Information Society, is attempting to utilize IT to improve organizational performance to achieve battlefield dominance. Hoping to receive the same results as other organizations that integrate advanced IT systems, the military seeks to increase its tempo of operations to out-decide and out-maneuver potential enemies. Given the similar operational environments in which these two types of organizations exist (i.e., corporate and military), the principles of the IT Implementation Model can be used to evaluate the military's current utilization of integrated information systems along with current warfighting practices (organizational processes), in an effort to increase warfighting ability (organizational productivity). Therefore, in addition to the before-mentioned Empowerment Process Model, I will also use the IT Implementation Model as a theoretical framework to assess the Marine Corps' current process of implementing information technologies to improve overall organizational performance during warfighting.

IV. THE GENERATIVE APPROACH

A. INTRODUCTION

To gain a competitive edge, or sometimes even just to survive, in today's constantly changing, time-critical, complex economic market, managers, business executives, and consultants continually seek to maximize organizational performance. In the previous two chapters, two of the most sought after methods to improve organizational performance were discussed – employee empowerment and IT investing. Based on an extensive literature review, in Chapter 2 it was determined that organizations that institute empowerment strategies will experience high performance results in the form of more effective organizational productivity. Furthermore, in Chapter 3 it was concluded that organizations that invest in IT and implement integrated information systems appropriately will experience high performance as a result of increasing the efficiency of the organization's key processes. The success of both models is dependant upon the environmental context in which these management strategies are performed. Though both models can result in high performance, neither, alone, results in situationally *optimal* organizational performance. A newer, organizational management paradigm does exist that draws upon the strengths of the two previous models to achieve maximum organizational performance: The Optimal Approach.

This chapter explores the final model of organizational management that will be used as an assessment tool for analysis. Before the Generative model is introduced, an explanation of organizational configurations is presented. Then an argument for the utilization of the Generative model is presented, the key components of the Generative model are identified, and the implications of instituting a Generative organization will be discussed. Finally, the relevance and applicability of this model in assessing military organizations operating under similar circumstances is discussed.

B. ORGANIZATIONAL CONFIGURATIONS

Business leaders realize that there is more than one way to manage an organization. The management method employed is dependant upon the contextual environment, strategies, structures, culture, market, processes, and procedures of the organization -- the organizational attributes. Since there are several factors that influence

the choice of management technique, organizational theorists have categorized patterns of organizational attributes into configurations that better explain how and why organizations function the way that they do. These configurations represent a clustering of organizational attributes and characteristics that describe the way an organization functions and performs (Roberts, 1998).

The development of organizational configurations allow for the examination of organizations with regard to a single management paradigm or holistic viewpoint, rather than by viewing the organization's individual parts. Roberts (1998) provides a comprehensive description of four organizational configurations, and their corresponding attributes with her "efficiency-effectiveness" model of organizational configurations. Her ideal, theory-based, deductively derived model provides the framework for my arguments in the remainder of this chapter.

1. Efficiency vs. Effectiveness

Based upon the Roberts (1998) model, there are two basic dimensions of organizational performance: efficiency and effectiveness. Both efficiency and effectiveness play an important role in organizational performance, yet competition for the organization's limited resources can cause interference that results in tension between the two efforts. The challenge of an organization's leadership is to determine the relative emphasis to be placed on each dimension, as well as the costs and benefits to organizational performance.

a. Effectiveness

Roberts (1998) defines effectiveness as "productive results" (p. 3); it is producing or achieving a desired outcome. Effectiveness is achieved by developing an understanding and interpretation of the external environment, which signals what ongoing adaptations in goals, processes, and outputs are required for the organization to be successful. In an effort to meet organizational goals in a complex and uncertain market environment, effectiveness requires exploration and experimentation. An effective organization would be one that is successful in producing its desired intentions by focusing primarily on the intentions (ends), more than on how the intentions are achieved (means).

b. Efficiency

Conversely, efficiency refers to the "capacity to produce results with the minimum expenditure of time, money, or material" (Roberts, 1998, p. 3); it means performing tasks quickly, inexpensively, and easily. Controlling and constantly improving internal organizational processes by formalizing and standardizing existing routine activities achieve efficiency. Central to efficiency are discipline, control, order, and repetition. Thus, efficient organizations that are run like well-oiled machines, meet success by focusing on mastering the internal processes of the organization to receive maximum output of invested efforts; a strict focus on the means vice the ends.

c. Roberts Model of Organizational Configurations

Given the explanation of the two dimensions of organizational performance described above, managers face a tough challenge in choosing the levels of efficiency or effectiveness that they intended to achieve in pursuit of increased organizational performance; each resulting in its own set of consequences. The Roberts Model (1998) illustrates four possible combinations of efficiency-effectiveness. Each configuration is an ideal type, theoretically derived from Roberts' research of public sector managers seeking different levels of efficiency or effectiveness. However, her configurations are consistent with other organizational theorists, such as Senge (1990), Mintzberg (1996), Mankin (1997), and others, who have conducted similar research of organizations in various industries. Therefore, an adapted form of the Roberts Model will be used to analyze the efficiency-effectiveness paradigm of organizational performance. Exhibit 4.1 is a graphic representation of the four organizational configurations identified in the Roberts Model, followed by a concise explanation of each.

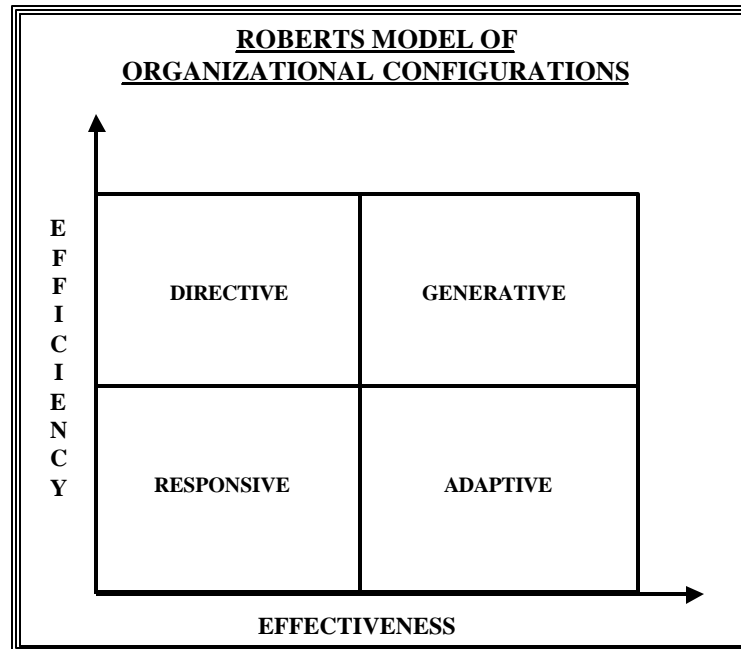


Exhibit 4.1

2. Responsive Configuration

The Responsive Configuration provides minimal attention to both efficiency and effectiveness. Leaders of this type of organization do not drive the organization towards either dimension, nor do they make it a point to relieve the tension or conflict between the two. Instead organizational leaders solve problems and make decisions as the situations arise, rather than dealing with problematic situations in some sort of logical or rational ordering. Organizations within the Responsive Configuration produce "inconsistent, disjoint patterns of activity in response to competing demands" (Roberts, 1998, p. 6). These organizations "muddle through" their normal taskings, operating without coherent policies or coordinated decision-making.

The Responsive Configuration results in the lowest overall organizational performance due to its inconsistent, sporadic, tumultuous system of operation. Because managers do not focus on either effectiveness or efficiency, they usually get neither. Perhaps this configuration may show short-term benefits in a highly regulated, conflict-ridden environment (Roberts, 1998), however, long-term results are most certain to be poor. Since the tenets of this configuration do not seek to establish a high-performance organization, the Responsive Configuration is not applicable to this research.

3. Adaptive Configuration

The Adaptive Configuration, also referred to as an Adhocracy or Innovative Organization, seeks to optimize effectiveness, while disregarding efficiency (Mintzberg, 1996b; Roberts, 1998). These organizations attempt to achieve organizational effectiveness by *adapting* to the external environment. Since leadership has already been defined in this research as "coping with change in the external environment," then this configuration would benefit most with managers who implement effective leadership practices, including empowerment strategies.

The two main principles of Adaptive organizations emphasize decentralized decision-making and innovative thought. These organizations rely on both members' knowledge and initiative to achieve productive adaptations and innovations in services (Roberts, 1998). An organization can take advantage of this type of approach only if the innovative decisions can be identified and acted upon by those members at lower levels in the organization. These organizations reward risk-taking in order to create an environment where truly innovative ideas can surface.

In the Adaptive Configuration, decentralized organizations are designed to focus on conducting collaborative projects through cross-disciplinary, cross-functional, and cross-departmental teams. These ad hoc project teams are formed to draw from the expertise resident in different disciplines to catalyze superior innovation. These teams are not rigidly controlled, but they rely on a general vision of the future provided by senior leaders, instead of specific goals, objectives, and fixed timelines. The goal of Adaptive organizations is to enable flexibility, creativity, and exploration; to abandon rigid adherence to internal order and control. Adaptive organizations do not seek to control their members, but to engage them in the organizational activities, which will produce greater results (Mintzberg, 1996b; Roberts, 1998).

The Adaptive Configuration is best performed in environments where managers are unable to prepare for conditions that cannot be foreseen (Roberts, 1998) and where the organization must master new ideas under conditions of dynamic change (Mintzberg, 1996b). This configuration is most prevalent in dynamic and complex environments. Therefore, Adaptive organizations utilize an organic structure to meet the challenges of a dynamic environment, and employ decentralized decision making to respond to the complexity of the environment.

Nevertheless, there are a few problems that are associated with organizations within this configuration. The Adaptive Configuration seeks to master the rapidly changing, uncertain external environment through innovation, flexibility, and creativity, but without focusing attention on its internal processes; it seeks to achieve effective organizational performance at the expense of efficiency. This configuration is inefficient in control, order, and timeliness, yet the biggest cost of inefficiency is the high price of communication. In the Adaptive organization, members spend a lot of time talking to each other to combine knowledge and develop new ideas. Adaptive organizations are not competent at performing ordinary tasks, because they exist and are designed to accomplish extraordinary tasks (Mintzberg, 1996b).

Based upon the principles of the Adaptive Configuration just mentioned, the Empowerment model presented earlier in this research is a key process used by organizations in this configuration. The Empowerment model focuses on the organizational intentions, or the organization's overall desired ends, with little focus on the means by which the ends are achieved. Furthermore, this model seeks to attain mastery of the external environment by employing effective leadership practices, which is also consistent with the ideas of the Adaptive Configuration. Flexible, adaptive, and innovative, the Empowerment model embraces the "new management paradigm" of employee empowerment, giving subordinate members the ability and authority to make decisions that affect the organization. Organizations that employ the Empowerment model seek to achieve positive, long-term effects; the result of which is increased organizational productivity in the form of effective performance, however, at the expense of efficiency.

4. Directive Configuration

The Directive Configuration, also referred to as a Machine Bureaucracy (Mintzberg, 1996a), resolves the tension between efficiency and effectiveness by focusing on achieving optimal efficiency, while devoting less attention to effectiveness (Roberts, 1998); exactly the opposite perspective of the Adaptive Configuration. Organizations that function under the paradigm are analogous to a well-oiled machine where the organization's people, processes, and procedures (its internal mechanisms) are rigidly controlled. The focus is on maintaining internal order of all dynamics within the organization, thus requiring strict management techniques.

The Directive Configuration emphasizes centralized control of the organization and standardized routines to simplify work tasks. Senior managers are the locus of decision-making and make all final determinations on courses of action; thus, reducing errors and perpetuating routine. Organizations functioning under this paradigm "require formalized jobs and standardized work to maintain orderly, reliable, and coordinated activity" (Roberts, 1998, p. 4). This configuration is most successful in simple, stable environments. Since change disrupts routines, managers of these organizations seek to minimize change by attempting to cut their organization off from external influences; innovation and flexibility are completely avoided. However, when change does come, organizations within the Directive Configuration use top-down modifications of their standard procedures to adjust to the change. In this configuration, organizations seek to master their internal processes to ensure that smooth, uninterrupted, efficient operations are maintained.

As with the other configurations, there are also problems that exist with this configuration. With its strict adherence to achieving efficient means, the effective end state is ignored. These organizations do a great job of performing the tasks, but many end up efficiently performing unnecessary tasks. The structure of Directive organizations is rigid and controlled, and does not possess the flexibility necessary to perform optimally in a constantly changing environment. Additionally, this configuration creates human resources challenges. In a Machine Bureaucracy, the employees are treated like machine parts, with restricted freedom and creativity. Their task is simply to do as senior managers, who perform all of the decision-making, tell them. This creates a bottleneck of information and decision-making at the apex, where managers are overloaded with problems. The result of this configuration is extremely efficient, yet long-term ineffective, organizational performance (Mintzberg, 1996a; Roberts, 1998).

The IT Implementation model described in Chapter 3 fits the Directive Configuration. Investing in IT systems is a management practice that concentrates on the means; it seeks to improve internal processes to achieve a mastery of internal organizational activities. The focus of IT integration is to help the organization achieve greater organizational efficiency; to master the organization's complex processes by utilizing systems that can provide better control and maintenance of organizational activities. However, this model does not account for changes in the chaotic and uncertain environment that may alter the routine organizational processes that are enabled by IT systems.

5. Hybrid Configurations

Roberts (1998) presents substantial research evidence for the Adaptive and Directive Configurations. She argues that this research identifies a "continuum on which high performance organizations position themselves" (p. 14). At one end of the continuum is the Adaptive Configuration, and at the other end is the Directive Configuration. Exhibit 4.2 depicts the diagonal line running between the two configurations as the Adaptive-Directive continuum.

According to the research, high-performance organizations tend to be positioned on either extreme of the continuum. Hence, depending on the situational assessment of

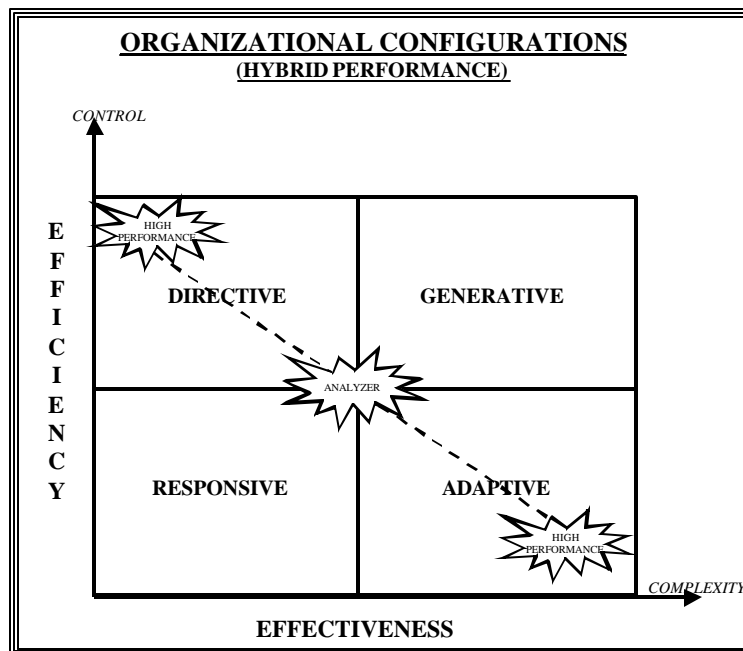


Exhibit 4.2

complexity and uncertainty and the need for internal process control, high-performance organizations are likely to be one of the two ideal types of configurations. However, other organizational types are also found along the continuum, creating hybrid configurations that pursue varying "degrees" of efficiency and effectiveness (Roberts, 1998).

At the center of the Adaptive-Directive continuum is a hybrid configuration referred to as the "Analyzer." Positioned where effectiveness and efficiency are both sufficiently compromised, the Analyzer has a dual focus to seek both the flexibility of the

Adaptive Configuration and the controlled order of the Directive Configuration. In order to incorporate both facets of stability and change, the hybrid configuration often adopts a matrix structure that permits the accommodation of static and dynamic operations (Roberts, 1998).

However, hybrids are not created without problem. Research has revealed that the greater the similarity between the Analyzer and either of the ideal types of the continuum, the greater the increase in performance (Roberts, 1998). In other words, organizational performance actually increases as an organization slides to either end of the continuum, focusing more on either one dimension or the other. This suggests that integration of the two separate paradigms is not necessarily a productive method of operation, and that ideal types are better performers than hybrids. Perhaps this is the case, because an organization's commitment to orient its focus towards either configuration resolves the competition for limited resources that continually exists; thus reducing the tension between efforts for efficiency or effectiveness.

6. Generative Configuration

The Generative Configuration, which is also referred to as a Learning Organization (Senge, 1990), Horizontal Organization (Ostroff, 1999), Enterprise (Halal, 1994), or an organization that has adopted the "New Management Paradigm" (Levine & Luck, 1994), demands optimal efficiency and effectiveness. The Generative Configuration seeks to achieve high performance by maximizing focus on the efficient and effective operation of the organization. Roberts (1998) explains the role of the manager who attempts to achieve optimal efficiency and effectiveness in organizational performance:

They search for ways to reconcile competing expectations emanating from the two dimensions: short-run and long-run perspectives; global and local considerations; individual and collective needs; social and economic concerns; security and freedom; change and stability; diversity and commonality of purpose (Roberts, 1998, p. 11).

Organizational leaders are considered "masters of the paradox" if they are able to move beyond merely "coping" with the challenges of complexity or change to mastery of them through exploring what I call the *Generative Approach*. Embracing this new concept requires a paradigm shift, one that demands a different way of thinking about organizational performance.

In the Generative Configuration, success is derived from a close-linked relationship with the organization's stakeholders. Stakeholders are internal and external parties who are key in meeting organizational objectives (e.g., employees, managers, senior executives, customers and service recipients). Therefore, efficiency derives from networked stakeholders working together to meet common means, while effectiveness comes from networked stakeholders working together to achieve common ends (Roberts, 1998). The stakeholders can network and collaborate in many different forums, including cross-functional and cross-departmental teams, internal partnerships, and external alliances. Therefore working in diverse teams and groups is key to the Generative Approach.

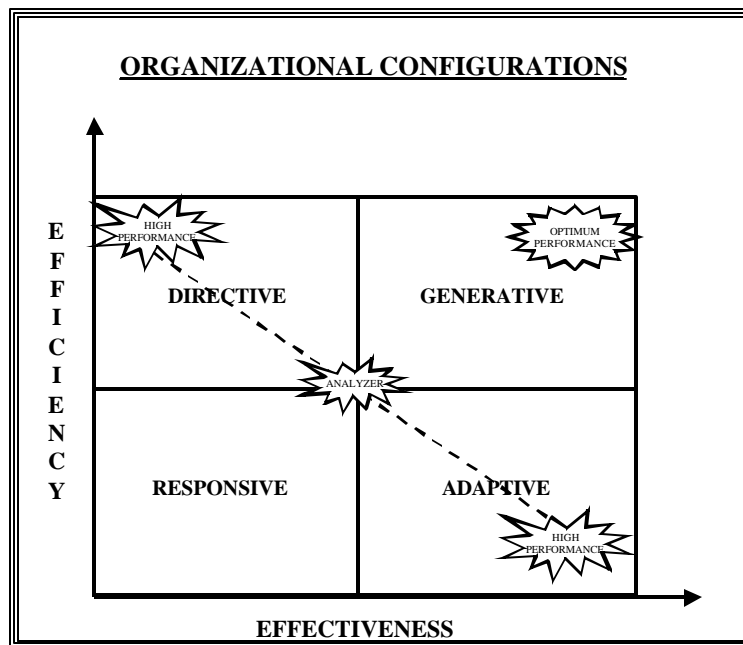


Exhibit 4.3

The purpose of this configuration is to promote generative learning within an organization in order to explore new ways of looking at the world; to inspire learning that creates the ability to *generate* new solutions to old problems (Roberts, 1998). Organizations within the Generative Configuration embrace a new organizational management paradigm that fosters a creative approach to increasing organizational performance. Organizations within this configuration permit an open, deliberative, problem solving process that requires pooling of information, resources, and skills in

order to deal with the complex issues that an organization faces while operating in a rapidly changing environment.

Also key to the Generative Configuration is the utilization of the network structure; incorporating inter-organizational linkages that produce a new organizational form, referred to as the networked organization (Roberts, 1998). Networked organizations view the organization as a system of interdependent processes that work together to achieve efficiency and effectiveness. When processes are centralized or departmentalized, they are slow, inefficient and difficult to manage. However, when organizations address this problem by synchronizing flows and decreasing batches across the functional boundaries in the organization, it can achieve simultaneous improvements in operational tempo (efficiency) and quality (effectiveness) (Levine & Luck, 1994). Theoretically, then, optimization of efficiency and effectiveness brought about by the Generative Approach results in optimal organizational performance.

7. Configuration 'Fit'

There are multiple paths to high organizational performance, however managers want to be careful to choose the configuration within which the organization will operate best, given the external environmental context. When it is found that an organization maintains consistency across multiple dimensions of design and within the appropriate context, then the organization is said to "fit" a particular configuration. Moreover, when the components fit a particular configuration's ideal, the organization is expected to be a high performer.

Given the conditions of today's complex, rapidly changing environment, the Generative Configuration is the best fit for organizations that operate in a competitive, uncertain market, that requires quality time-critical, long-term solutions; seeking efficient means to effective ends. By developing creative methods of determining new solutions to the old problems, and with an emphasis on maximizing effectiveness and efficiency, Generative organizations can expect to be highly successful, high performance organizations. Though there are few organizations that currently meet these requirements, today there are many attempting to match them calling it "the new management paradigm" or "postmodern organization" (Roberts, 1998). Currently undergoing experimentation, these organizations seek to reap the potential benefits of truly generative thinking.

C. EXPLORING THE GENERATIVE APPROACH

To stay competitive in today's complex market, business executives are arguing whether to invest in IT or human resource programs. They are debating which is more important: improving IT infrastructure or workforce development. Therefore, some organizations increase their investments in new technologies, and others use teams (or other empowering principles) to do more of their work, hoping for a return in productivity. Yet, few get the results that they expect, because they do not take full advantage of the possibilities created by both (Mankin, Tora, & Cohen, 1997).

Business executives are now understanding that IT investment alone will not produce the types of results needed to be "high performance" in the future, nor will implementing more teams make the organization more effective. They are realizing that it must be a mix of both IT and people power to produce truly high performance results. New IT systems should provide empowered employees (and teams) the detailed information they need to make the best business decisions (Stuart, 1994); and engaged, empowered employees can help fulfill the potential promises of IT through innovative and creative implementation (Mankin et al., 1997). Integrating the two creates a joint impact that is much greater than the sum of their individual parts.

There have been recent reports to support the notion of optimizing IT investments and employee empowerment to improve organizational productivity. According to a census taken by Industry Week in 1998 (Brandt), 31% of organizations that used IT extensively showed productivity growth of greater than 20% over five years. Comparatively, only 25% of all organizations in the poll reported the same level of growth over the same period of time. The data substantiated that IT does improve organizational productivity. Additionally, in the same research, data have also shown that the use of empowered teams increases, almost every measure of productivity and quality. However, striking results emerge when organizations implement simple, well-known empowerment strategies (i.e., self-directed work teams) along with extensive IT use. Of the firms that combined IT investment with employee empowerment strategies, 41% of them experienced productivity increases of 20% or more over five years (Brandt, 1998).

Thus, based upon theoretical notions and research data, to achieve the maximum potential performance, organizations need to optimize means and ends, efficiency and

effectiveness, IT implementation and employee empowerment. Applying the Generative Approach to organizational management provides a model to accomplish that.

D. COMPONENTS AND CHARACTERISTICS OF GENERATIVE ORGANIZATIONS

In order to implement the Generative Approach, there must first be an understanding of what factors make a Generative Organization. Based upon the principles identified through previous research, I will identify and explain the components of a Generative Organization as they relate to the following organizational design factors: Environment, Organizational Structure, Task Requirements, Task Assignment/Performance, Coordination, and Technology Implementation. Since Adaptive and Directive organizations are proven “high performance” configurations, and most Generative organizations are still in an experimenting phase, the components of the Generative organization will be presented in relation to the already-proven Adaptive and Directive designs. Exhibit 4.4 shows a comparison between the three applicable configurations.

ORGANIZATIONAL STRUCTURES

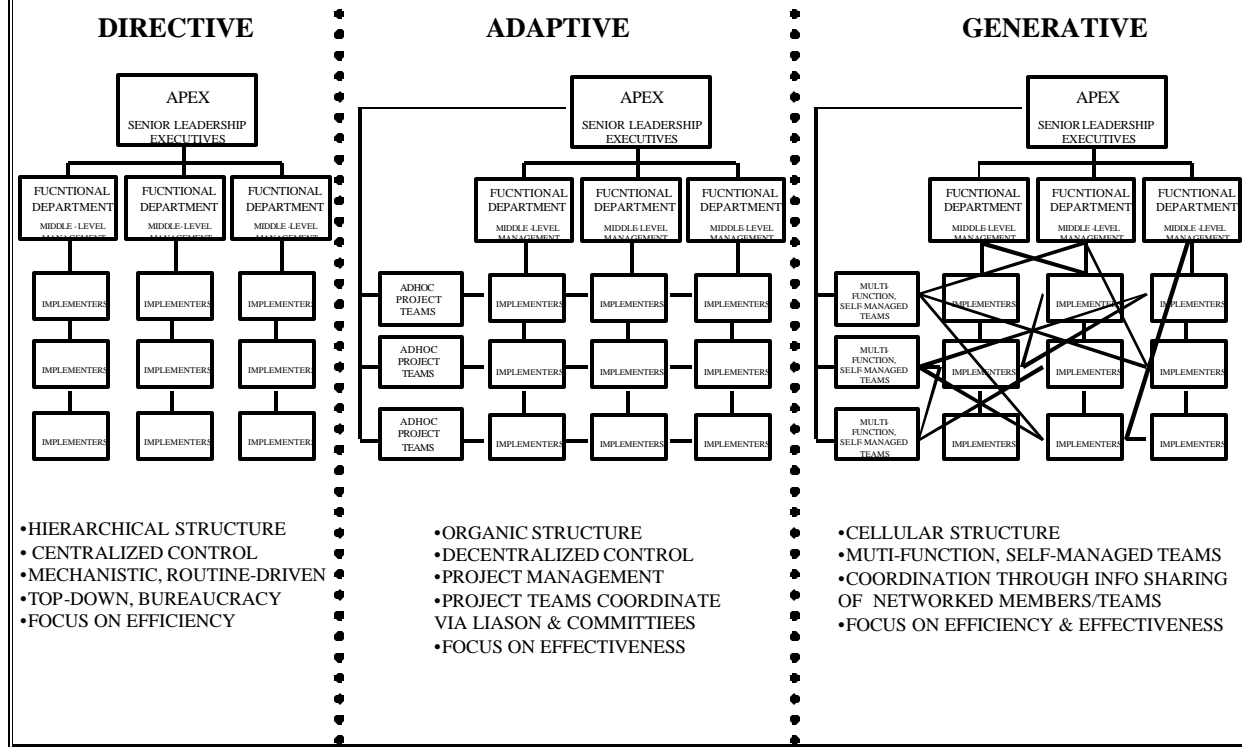


Exhibit 4.4

1. Environment

The environment includes the descriptive attributes of the external context in which the organization is functioning. Directive organizations, originally designed for the Industrial Age to manage the routine tasks of the uneducated work force, perform best in a simple, stable environment where processes can be controlled and efficiencies achieve competitive advantage (Halal, 1994). However, Adaptive organizations are more fitting to a dynamic, rapidly changing environment.

Generative organizations, on the other hand, are designed to exist in competitive *and* changing external environments. The complex and chaotic environment brought about by the Information Age will cause organizations to abandon the management style of the hierarchy dominated industrial age (Halal, 1994). This new environment challenges past assumptions about management and requires a different approach to management -- The Generative Approach

2. Organizational Structure

The structure of an organization affects the reporting chains, workflow, and decision-making processes within the organization. Structure can be a hindrance to performance or it can facilitate the smooth transfer of information and decisions throughout the organization. Directive organizations, also named machine bureaucracies, utilize centralized, controlled, hierarchical structures. This approach seeks to minimize the amount of external interaction, and maximize the efficient performance of internal activities. Unfortunately, hierarchical structures can impede the decision-making process, since all problems are "stove-piped" to higher levels of management. Adaptive organizations utilize ad hoc, decentralized project management to achieve long-term effective results, but at the expense of efficiency.

The team-based, technology enabled organizations (i.e., Generative organizations) "require flexible, high-level infrastructures to integrate the two forces in ways that serve overall effectiveness" (Mankin, Bikson, & Cohen, 1997, p. 2). Therefore, Generative organizations employ a networked structure that links all of the stakeholders within an organization (e.g., employees, teams, managers, and senior executives) to share and exchange information needed to make good business decisions. Networked organizations that utilize empowerment strategies group individual stakeholders into empowered, cross-functional teams that are encouraged to conduct horizontal communication between teams (Levine & Luck, 1994; Mankin et al., 1997). By allowing employees and teams to make decisions that affect the organization (Ostraff, 1999) the need for unnecessary layers of management is reduced and the overall efficiency and effectiveness of operations is improved.

3. Task Assignment

Task Assignment refers to who in an organization can originate orders, initiatives, and ideas, and who has the authority to take action on or make decisions about those ideas. In Directive organizations, orders come from the top down with little input from below (Roberts, 1998). The centralized decision-making process of this type of organization means that only high-level managers or executives are authorized to make critical decisions, and low-level employees are expected just to carry out their assignments (Malone, 1997). Whereas, in Adaptive organizations, employees are given the freedom of choice within the guidelines of the vision and values set by senior

leadership (Roberts, 1998). This independent decentralized, method of decision-making is surely innovative and effective, but it is inefficient in that each project team goes about accomplishing tasks in its own manner, without much lateral coordination between teams (Malone, 1997)

According to Mankin, Bikson, and Cohen (1997), new policies, and processes must evolve to support empowered teams utilizing advanced technologies as they operate within, and increasingly across functional boundaries. The Generative organization seeks to develop ideas, initiatives, and solutions to complex problems by pooling the knowledge of all of its members. Within the Generative Approach, strategic, long-range issues are formed by senior executives at the top; but the methods to meet the vision and the authority to decide upon the methods is delegated to multi-function, self-managed teams made up of employees from throughout the organization. In these organizations, those at the apex issue the vision, but the members of the organization make the decisions and do the work. If the employees are properly trained and resourced, then they will do well, and managers can avoid micro-managing (Levine & Luck, 1994; Mankin et al., 1997)

4. Task Performance

If Task Assignment refers to where orders, initiatives, and ideas originate in an organization, then Task Performance refers to how they are carried out. Directive organizations thrive on establishing standardized, specialized, and formalized procedures. Once orders come down, low-level employees do not have much choice in how they decide to go about executing the task; most likely, there already exists a routine method to complete the task. On the other hand, Adaptive organizations take a more "bottom up" approach to task performance. Once a general vision is issued, an expert-based project team is expected to flush out the details necessary to complete the task, drawing upon the expertise, knowledge, and experience of its members.

Although both methods above can be successful at achieving their intentions (either effective or efficient performance of tasks), a generative approach draws upon the strengths of both. Halal (1994) argues the necessity for a generative approach to task performance claiming that, "modern economies require organic systems composed of small, self-guided enterprises that can adapt to their local environment more easily creating a form of organization that operates from the bottom up" (p. 69). He is

suggesting that an organization can be run from within by establishing smaller entities (e.g., self-managed teams) that run themselves like smaller versions of the overall organization, by receiving the equivalent information possessed by the parent organization via a data network. If workers are sufficiently trained and formed into self-managed teams, they can manage the processes that they operate better than managers could. This practice would enable immediate process improvement from the workers and free up managers to be more forward looking, resulting in performance that is more efficient. Additionally, employing these empowerment strategies would result in performance that is more effective due to increased employee participation (Levine & Luck, 1994; Mankin et al., 1997).

5. Coordination

Coordination refers to the method of communicating the task assignment and reporting the task performance; it is how decisions and results are filtered throughout the organization. Directive organizations use a hierarchical structure to communicate organizational intentions, and implement routines and standard procedures to complete the tasks. However, if a change in the environment occurs that requires either the intentions or the procedures to be altered, Directive organizations must endure a slow decision-making process that requires lower-level employees to wait for new orders to be issued or have their decisions acknowledged by upper-level managers. Adaptive organizations use liaison and committee-type methods of communicating and discussing possible solutions. Though this method is effective, it is very time-costly in resolving long-term problems and building consensus across competing perspectives (Roberts, 1998).

Generative organizations communicate and coordinate efforts by networking all internal entities within the organization to share and exchange information in real-time (Roberts, 1998). Information that is maintained in one part of the organization can be quickly accessed and distributed to other areas in the organization via IT networks, thus reducing the cost of communication and making available information that will allow for more informed decision making.

6. Technology Implementation

Technology Implementation refers to the approaches that organizations take in improving performance by exploiting the value of technology. Directive organizations, with their focus on control, routines, and processes, use technology to increase the speed of operations by automating routines and improving processes; they seek to maintain control of the internal activities of the organization by imposing stricter management of the internal processes. Adaptive organizations seek to explore innovative and creative new methods of employing technology; they seek to use technology to keep pace with the changing external environment.

A Generative, networked organization, seeks to exploit the advances in technology to enhance its organizational processes. Integrating internal operations through networking, information sharing, and information exchanging, technology enables the Generative organization to exploit speed, distance, and decision-making processes. Integrating information technology across geographic, functional, and departmental boundaries increases the speed of operations and provides information for better decision making within the organization. Furthermore, the use of technology serves both internal efficiency and externally driven effectiveness and adaptability.

7. Synthesis

Based upon research data, Directive and Adaptive organizations operating under the ideal configuration have the potential to become "high-performance" organizations within their respective environmental parameters. However, a new paradigm is emerging that optimizes the effects of both configurations -- The Generative Configuration. Though based upon theoretical notions, the Generative Approach promises to help organizations reach the highest performance levels in situations requiring both flexibility (effectiveness) and control (efficiency). Yet, in order to implement the Generative approach, managers must invest in leadership and management strategies that accomplish the generative organizational design factors presented above. Implementing successful changes in one area can be daunting, but attempting to improve in several areas at once surely has the potential to be overwhelming. The multi-dimensional change can be difficult, however the results are optimal performance never before experienced (Mankin et al., 1997). Appropriate implementation of these factors produces a Generative

Configuration that enables organizations to focus on means and ends, yielding both efficient and effective results that lead to optimal organizational performance.

E. ASSESSMENT OF GENERATIVE APPROACH (THE GENERATIVE PERFORMANCE MODEL)

Meshing the principles of the Empowerment Model and IT Implementation Model presented before, a final model is introduced that depicts the principles necessary to achieve the optimum organizational performance of a Generative Organization.

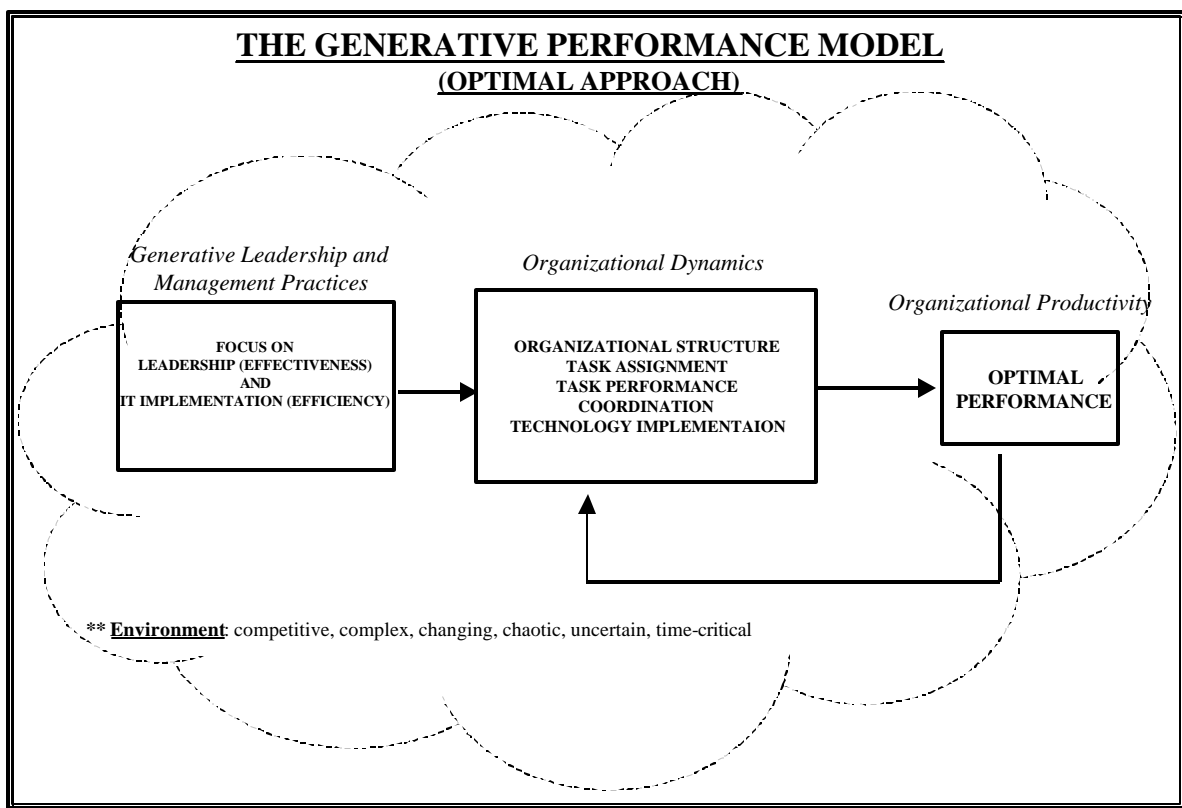


Exhibit 4.5

Exhibit 4.5 below is a graphic representation that synthesizes the theoretical concepts of a Generative Organization; one that focuses on maximizing efficiency and effectiveness.

In this model, a concentration on both leadership (effective) and management (efficient) practices is necessary to influence the organizational behaviors that yield productivity. Specifically, an organization that seeks to remain competitive in today's, complex, chaotic, rapidly changing market, will need to invest in effective leadership and

efficient IT implementation strategies (Brandt, 1998). Integrating these new strategies will obviously affect the dynamics of the organization. Generative practices will affect the way that the organization is structured, how tasks are assigned, how tasks are performed, how internal and external entities coordinate with one another, and even how technology is exploited to improve each of these processes. Proper integration of the two will yield an organization with empowered employees, who utilize improved organizational procedures enabled by information technology to produce optimum organizational performance. This increased level in organizational productivity generates a continuous cycle of organizational learning in the form of validated feelings of employee empowerment, and improved organizational processes.

F. APPLICABILITY TO MARINE CORPS WARFIGHTING

In Chapter 2, the applicability of the Empowerment Model was explained, which was based upon civilian organizations that function in an uncertain, chaotic, rapidly changing environment, to military organizations that function in similar circumstances during warfighting. Additionally, in Chapter 3, I explained that the IT Implementation Model was also applicable to military organizations operating in a complex, competitive, time-critical environment during warfighting, though this model was also based upon the study of civilian organizations. Finally, then, I submit that the Generative Model also pertains to the military, as I have already substantiated that the military must function in a similar complex, competitive, rapidly changing, chaotic, uncertain, and time-critical environment required by Generative Organizations. Unlike the previous two models, which fit into limiting organizational configurations (Empowerment Model into the Adaptive configuration and the IT Implementation Model into the Directive configuration), the Generative Approach to organizational management focuses on maximizing efficiency and effectiveness to achieve optimal organizational performance. Very few organizations currently fit this configuration, but today several organizations are experimenting with these concepts, attempting to match the results created by this new management paradigm (Roberts, 1998). Though many organizations have not yet achieved the requirements set forth for generative operation, there is substantial research to suggest that investing in employee empowerment strategies and new information technologies does increase organizational productivity (Brandt, 1998). Therefore, in an effort to identify optimal performance, as opposed to just high performance, I will also

use the Generative Performance Model to assess the warfighting performance of the Marine Corps units during experimental exercises that the Marine Corps uses to test and evaluate innovative warfighting concepts.

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V. EXAMINING AND ASSESSING WARFIGHTING CONCEPTS

A. INTRODUCTION

The purpose of this chapter is to examine the Marine Corps' warfighting concepts as affected by the implementation of advanced information technologies and their integration with subordinate empowerment strategies. I will focus on examining current, future, and hypothetically potential warfighting concepts as they relate to the issues of organizational design (force structure), human behavioral dynamics (leadership empowerment), process execution (tactics, techniques, and procedures), process management (command and control), and varying methods of achieving organizational productivity (warfighting performance) through effectiveness and/or efficiency.

In this chapter, the focus will be on warfighting concepts to mold an argument that will be applicable to a Marine Corps-style of warfighting. What I intend to capture are the assumptions, opinions, and ideals held by Marine Corps leaders as they prepare for and conduct the turbulent, complex, and dynamic act of warfare. It is important to capture the essence of the military's theory of war, because the assumptions derived from this theory will drive the organizational practices (preparation and conduct), which result in some level of organizational performance. In addition, the goals, theories, and assumptions establish the criteria used to determine the effectiveness of performance. In other words, a military force's assumptions and beliefs about the nature of war determine the methods that it employs to prepare for and conduct war. Consequently, that force will establish measures of performance based upon its original assumptions and beliefs about warfare. As Alberts (1996) suggests, a military force's doctrine – their theory of war – provides the standards of conduct of the war and shapes the culture and mindsets of every individual within the organization. In this chapter, we will see how doctrine may lead to precepts for evaluating organizational performance that reflect a particular paradigm that may emphasize either organizational efficiency or effectiveness (from Chapter 4).

The Marine Corps currently subscribes to the Maneuver Warfare concept of warfighting, therefore the conduct of warfare will be examined as supported by this view. Although this style of warfare has been evaluated as a successful means of achieving effective warfighting performance, identifying the measures of merit used to evaluate this

style of warfare will reveal that it is a one dimensional (effectiveness-focused) approach to achieving optimal warfighting performance.

In this research, it has also been noted that organizations have discovered the potential of investing in information technology (IT) implementation and integration to improve organizational productivity. Appropriate IT utilization will improve organizational processes, which will result in more efficient organizational performance. The U.S. military has also realized this potential and seeks to exploit IT to achieve battlefield dominance in future military engagements, through a concept termed the Revolution in Military Affairs (RMA) System-of-Systems. Though the concept is sound, this style of warfare also emphasizes successful organizational performance in only one dimension (efficiency-focused).

Furthermore, in previous chapters, it was also postulated that optimal performance could be achieved if organizations adopt a new way of thinking about conducting business, seeking to focus on the effective and efficient operation of their organization. Thus, new beliefs about the nature of future operations generate empowering strategies combined with information-based strategies that enable the achievement of a level of performance never before experienced. From this concept emerges a potential style of warfare, referred to as Network-Centric Warfare (NCW) that attempts to attain a level of performance that is only possible by focusing on both dimensions of organizational productivity. At the root of this concept is the investment in and implementation of advanced IT systems, and their integration with an empowering military philosophy of command.

The potential strength of NCW is in developing information superiority to dominate the battlefield by linking all battlefield entities to improve battlefield awareness and reduce the decision making cycle, resulting in an optimal level of warfighting performance in a complex environment. Because this concept was formed based on organizational theory and adapted from the practices of civilian, commercial organizations, the interesting issue presented is how this idea applies to military warfighting. What happens when a military organization that is typically effects-focused, implements/integrates IT systems and procedures that influence its efficiency at the same time?

Thus, this chapter will examine the concepts of the three, abovementioned warfighting paradigms utilizing the principles from the pre-established theoretical models. This examination will provide better insight into the organizational processes

used by Marine Corps forces operating under particular paradigms and set the stage for assessing the warfighting performance within each.

B. THE CONDUCT OF WAR

Given the theoretical framework for organizational constructs and the principle aspects of warfighting⁵, the focus of this research will now examine the actual conduct of war. Here, the challenge for senior leadership is to identify and adopt a concept of warfighting that can function within the complexities of war, suits the Marine Corps' philosophy of war, and meets the requirements for which the Marines have prepared. This concept must be able to function in an uncertain, chaotic, rapidly changing environment, while also providing a military force the ability to actually exploit this complex environment to impose its will upon the enemy. The concept must also be consistent and applicable in all levels and across all spectrums of warfare. Concepts that govern the conduct of war should recognize the potential power of getting people to participate as competent decision makers and utilize technology to enhance the necessary practices of combat. Finally, the conduct of war is defined by concepts that allow a military force to achieve victory over a potentially numerically superior foe.

The three warfighting paradigms that will be discussed in this chapter (i.e., Maneuver Warfare, RMA System-of-Systems, and Network-centric Warfare) meet the requirements mentioned above, but to varying degrees. Each takes a strikingly different approach to achieving increased warfighting performance (organizational productivity). We will find that, applied in the proper environmental context, all of them lead to a high level of organizational performance, but only one paradigm is predicted to result in optimal performance, as defined by the models presented in Chapter 4.

1. General Systems Model for Analysis

In an effort to facilitate the detailed analysis of these three warfighting concepts, particularly in relation to earlier-presented organizational theories, the systems approach

⁵ Appendix A: *Marine Corps Warfighting Doctrine* describes the Marine Corps' basic philosophy on warfighting as it relates to the nature, theory, and preparation for warfare. If the reader does not have a firm grasp of these concepts, it is suggested that Appendix A be reviewed before continuing. Throughout the remainder of this chapter, many ideas will be presented based upon an understanding of Marine Corps warfighting doctrine.

to analysis will be used. Exhibit 5.1 depicts the components of a general systems model that describes the basic factors that affect organizational productivity. In general, organizations form goals and assumptions about how operations should be conducted. These assumptions guide the practices that organizations perform in an effort to exploit the potential power of people and/or technology, with the goal of achieving a high level of performance. Applied in the correct environmental context, these practices lead to a particular level of organizational productivity. The measures of productivity are typically reflective of the original assumptions and theories of operation.

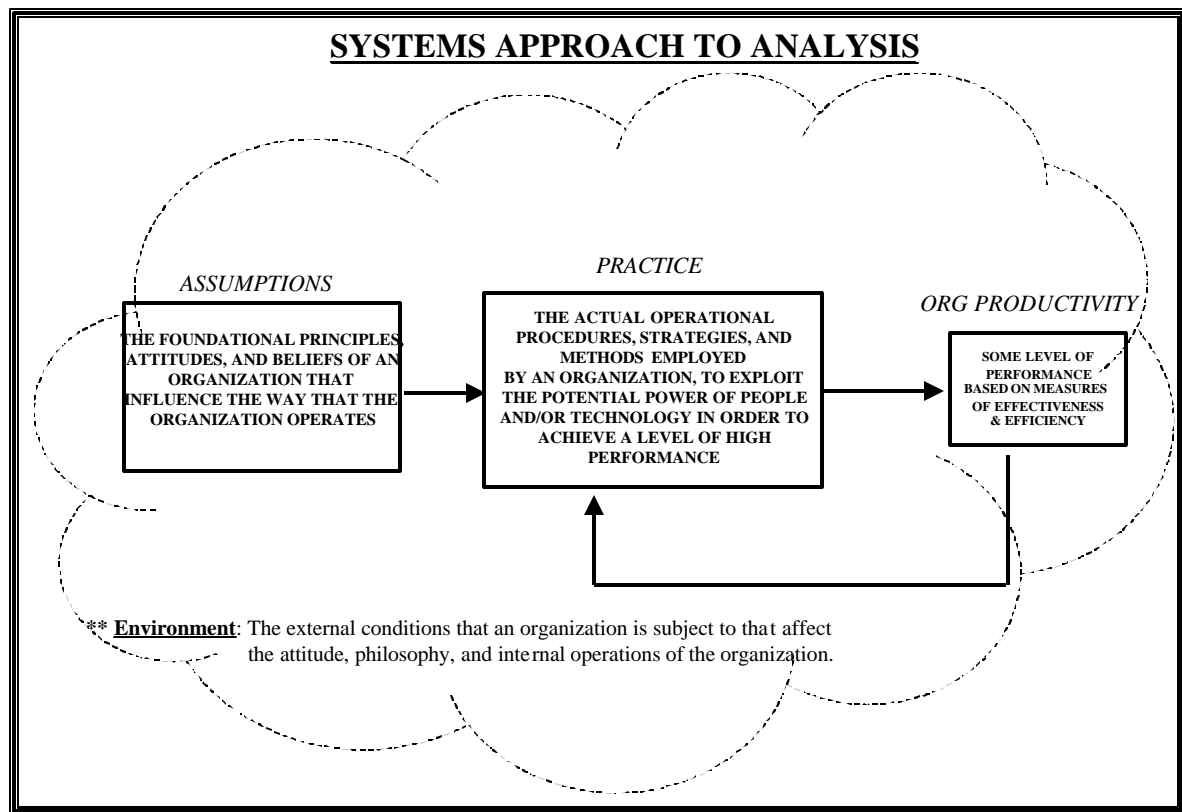


Exhibit 5.1

For the remainder of this chapter, the focus will be on the concepts that govern the conduct of war for the three warfighting paradigms. The examination of each paradigm for the conduct of war will be accomplished using a form of the systems model above and the organizational models presented earlier. I intend to establish that evaluating warfighting performance is a function of measuring factors identified as important based upon the theory, assumptions, and consequently the expectations of war. The question is,

which set of assumptions (warfare concepts) lead to an evaluation of a warfighting force that is capable of performing at a more optimal level.

C. CONDUCT OF WAR: MANEUVER WARFARE

As previously mentioned, the challenge for military leaders is to adopt a warfighting concept that encapsulates the essential aspects of the nature, theory, and preparation of war. The Maneuver Warfare doctrine answers these challenges. It is the current Marine Corps doctrine of warfighting based upon "rapid, flexible, and opportunistic warfare" (*Warfighting*, 1989, p. 58).

Founded around the Korean War era and instituted since the Vietnam War, Maneuver Warfare has historically been a successful warfighting theory. Contrary to attrition warfare and (linear) Napoleonic-era structure of rank and file units, Maneuver Warfare seeks to move where the enemy is not, and hit the enemy where he is weakest (Lind, 1985). Maneuver, or rapid and flexible movement of military forces, is central to this concept of warfare, for the objective is to move about the battlefield with speed, surprise, boldness, and audacity exploiting the enemy's weaknesses and shattering their mental, physical and emotional will. Because flexibility is important in this type of warfare, a form of decentralized command organization is employed to provide more freedom and autonomy so that maneuver forces can strike the enemy quickly and decisively. In *Warfighting* (1989), Maneuver Warfare is described as "a warfighting philosophy that seeks to shatter the enemy's cohesion through a series of rapid, violent, and unexpected actions which create a turbulent and rapidly deteriorating situation with which he cannot cope" (p. 59). Maneuver, tempo, surprise, violence, and concentration, are important components of maneuver warfare. However, the underlying focal point of this concept is the human dimension of warfare, which cannot be ignored. The desired effects of Maneuver Warfare are not necessarily quantifiable by using traditional measures, because it seeks to defeat the enemy by creating a violent environment in which he cannot cope, shattering his physical, mental, and emotional will. Following are the factors that make the maneuver-style conduct of war possible.

1. Philosophy of Command

The philosophy of command refers to the way that the military leaders think about the violent act of war. Therefore, the way that a military force thinks must equal the way

that it fights. There are three essential factors that regulate the thought process of forces that exercise maneuver warfare concepts: Decentralized Command, Human Dynamics, and Coping with Chaos.

a. *Decentralized Command*

Marine Corps doctrine dictates that flexible, effective military operations are possible only when command is decentralized and less controlled. It is explicitly written in the *Warfighting* (1989) publication that, "first and foremost, in order to generate the tempo of operations we desire and to best cope with the uncertainty, disorder, and fluidity of combat, command must be decentralized" (p. 62). Command decentralization requires competent leaders at all levels that must demonstrate sound and timely judgment in battle.

Decentralized command is sought, because it increases the tempo of operations and pulls from the knowledge and experience of battlefield "experts." Every U.S. military service, except for the Air Force, recognizes that an increase in operational tempo requires command decentralization down to the lowest levels (Roman, 1997). Subordinate leaders must make decisions on their own initiative based upon understanding of the commander's intent (i.e., the final results that he desires on the battlefield) rather than slowing speed of command by passing orders and information up and down a stovepiped chain of command. Marine Corps leaders realize that a competent subordinate leader at the point of decision may be better suited to handle the situation than a senior leader far removed from the battle. According to the Model of Empowerment presented in Chapter 2, this reflects the notion of choice, based upon competence.

b. *Human Dynamics*

Secondly, the Marine Corps philosophy of command is centered on human characteristics rather than equipment or procedures. Although, it is accepted that advanced technological communications systems and command and staff procedures can enhance the ability to command during combat, they must not ever be used to replace the human element of command (*Warfighting*, 1989). Variables of the human dynamic element include courage, decisiveness, initiative, ingenuity, intuitiveness, teamwork, confidence, experience, and many other personal attributes of effective military leaders.

Likewise, one cannot ignore the negative aspects of human dynamics, including fear, self-preservation, hesitancy, and others. The philosophy of command within a Maneuver Warfare environment is that effective leaders must be placed in critical decision-making positions within the unit. Acknowledgement of the human dynamics of warfare requires effective leadership, as opposed to emphasizing efficient management practices and technological innovations that focus on the means vice the ends of conducting warfare.

c. Coping with Chaos

Lastly, how military leaders and decision-makers learn to function within the chaos present during warfighting plays a significant role within the philosophy of command. Leaders recognize the challenging environment in which war is conducted. However, since maneuver warfare is a disorderly style of warfighting, leaders cannot gain full control of the battlefield situations. Therefore, commanders who try to gain "control" of the uncontrollable process of war are doing their units disservice. Since commanders cannot maintain positive control at all times, they must be constantly prepared to operate within a chaotic environment of uncertainty, complexity, and rapid change.

2. Decision Making

The act of decision-making is a continual, time-competitive process, and the rapid execution of this process is key to the maneuver warfare concept. In war, the opponent who can make and execute decisions consistently faster will have an advantage on the battlefield. The basic ideal of maneuver warfare is to confound the enemy by functioning under an extreme rate of speed (operational tempo) while completely out-deciding, and out-maneuvering the enemy (Lind, 1985).

Out of this method of engagement, was birthed the Boyd Theory or OODA (Observe-Orient-Decide-Act) Loop. Colonel Boyd, an Air Force fighter pilot during the Korean War, determined that conflict could be seen as time-competitive observation-orientation-decision-action (OODA) cycles. Simply described, in battle one *observes* himself, including his physical surroundings and the enemy disposition; he *orients* himself to the perceived situation based upon his observations; then he makes *decisions* based upon his orientation; and finally, he puts his decisions into effect by *action*. Since his last action has changed the situation, he observes again, and starts the process all over again (Lind, 1985). In maneuver warfare, the opponent who goes through the OODA

cycle most quickly by making rapid, yet sound, decisions gains a tremendous advantage that eventually leads toward victory in battle.

3. Mission Tactics

The Marine Corps Maneuver Warfare doctrine prescribes that mission tactics be used in warfighting; this is the practice of assigning missions to subordinates without specifying how the missions must be accomplished. This method of command delegation allots subordinate leaders the freedom and authority to decide on courses of action, within the senior commanders' prescribed intent, that affect the order of battle. There are two components to executing mission tactics that encourage this hands-off-style approach to leadership and generate a quicker operational tempo: mission and commander's intent (*Warfighting*, 1989).

a. Mission

The mission, simply, is the task to be accomplished. When missions are assigned to subordinate leaders, the leaders are provided with all of the available information essential to accomplish the mission without being told exactly how to go about doing so; the mission is the "who, what, where, and when" of a situation, without the "how" of engagement. The responsibility is left up to competent, subordinate leaders to determine how their unit will go about meeting the tasks. Senior commanders determine the time, place, and method of execution only to the extent that coordination is required for the concentration of effects (*Warfighting*, 1989).

b. Commander's Intent

The commander's intent describes the senior commander's final desired result of the actions to take place. The intent should convey the commander's vision of final effects on the battlefield and is intended to guide (not direct) the actions of subordinate decision makers. Although situations on the battlefield may change a subordinate leader's method of execution, the commander's intent does not change. As was determined earlier, the complexities of warfare require that military operations be flexible and capable of adapting to any situation. Therefore, issuing a commander's intent allows subordinates to exercise initiative and operate freely (demonstrating flexibility and adaptability) within the boundaries of the commander's vision. It is

Marine Corps doctrine that leaders at all levels know the intent of their seniors two levels higher (*Warfighting*, 1989). Thus, the potential exists for junior leaders to exercise initiative two levels up from their scope of operation.

4. Maneuver Warfare as an Empowering Notion

The aspects of warfighting currently explored appear to parallel concepts expected of organizations that adhere to an adaptive approach to performance. The principles of the Marine Corps' method of conducting warfighting, Maneuver Warfare, are consistent with the flexible, creative, and innovative techniques of Adaptive organizations. The practitioner of Maneuver Warfare accepts three fundamental concepts in its operation: decentralization of command, a human behavioral focus – vice technological focus (e.g., leadership vice management, ends vice means, and effectiveness vice efficiency), – and the ability to function in chaos. These concepts require competent demonstration of flexibility and adaptability. Military engagements are planned and executed using mission tactics, which empower subordinate leaders to exercise individual initiative and decision-authority within the bounds of a senior's prescribed vision. Thus, decentralized empowerment leads to rapid execution of the decision-making process, which allows forces to out-pace the enemy and eventually break his will. The result of organizational productivity under this warfighting paradigm is an effective achievement of the commander's intent, focusing on the attainment of desired effects, instead of seeking quantifiable measures of efficiency.

a. *Maneuver Warfare Model*

Based upon theoretical models developed in earlier chapters, it has already been determined that organizations fall into one of several configurations, based upon their organizational attributes. The characteristics presented by the Marine Corps' implementation of the Maneuver Warfare concept are closely aligned and most compatible with the Adaptive Configuration. Exhibit 5.2 revisits the Empowerment

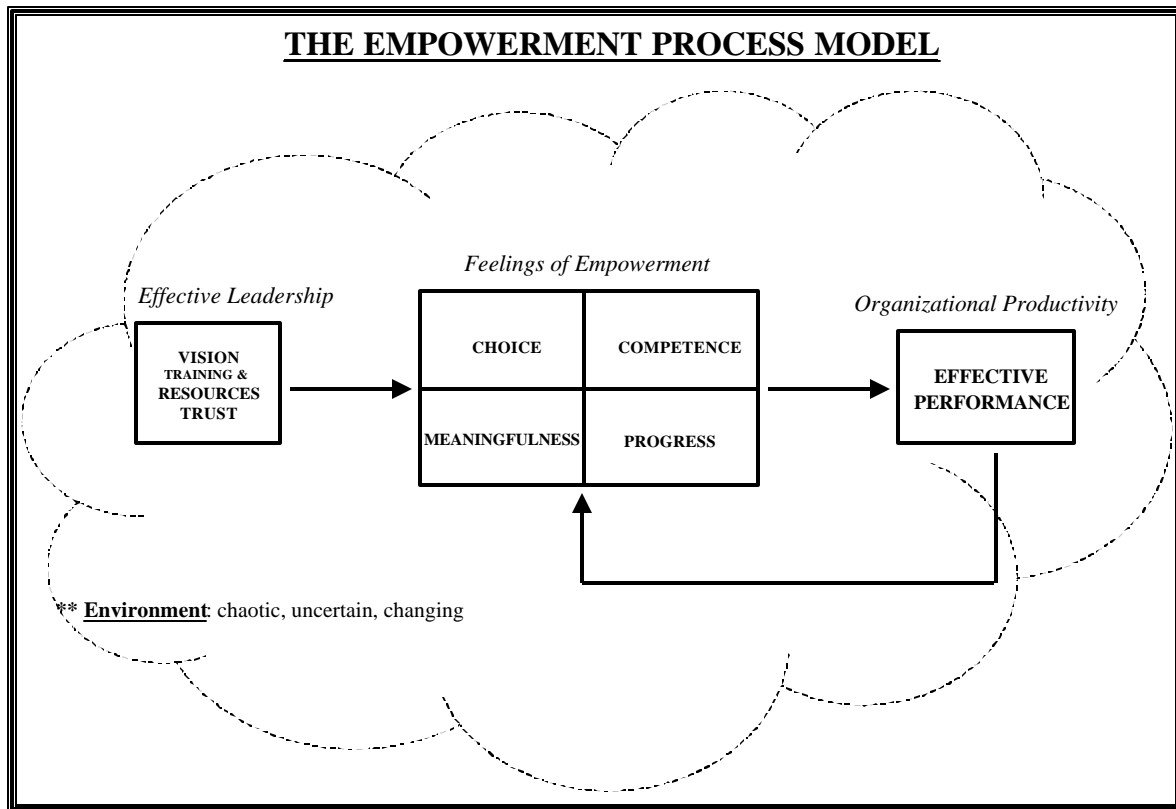


Exhibit 5.2

Process Model (an adaptive approach to organizational performance presented in Chapter 2) and provides a comparison for the Maneuver Warfare Model in Exhibit 5.3.

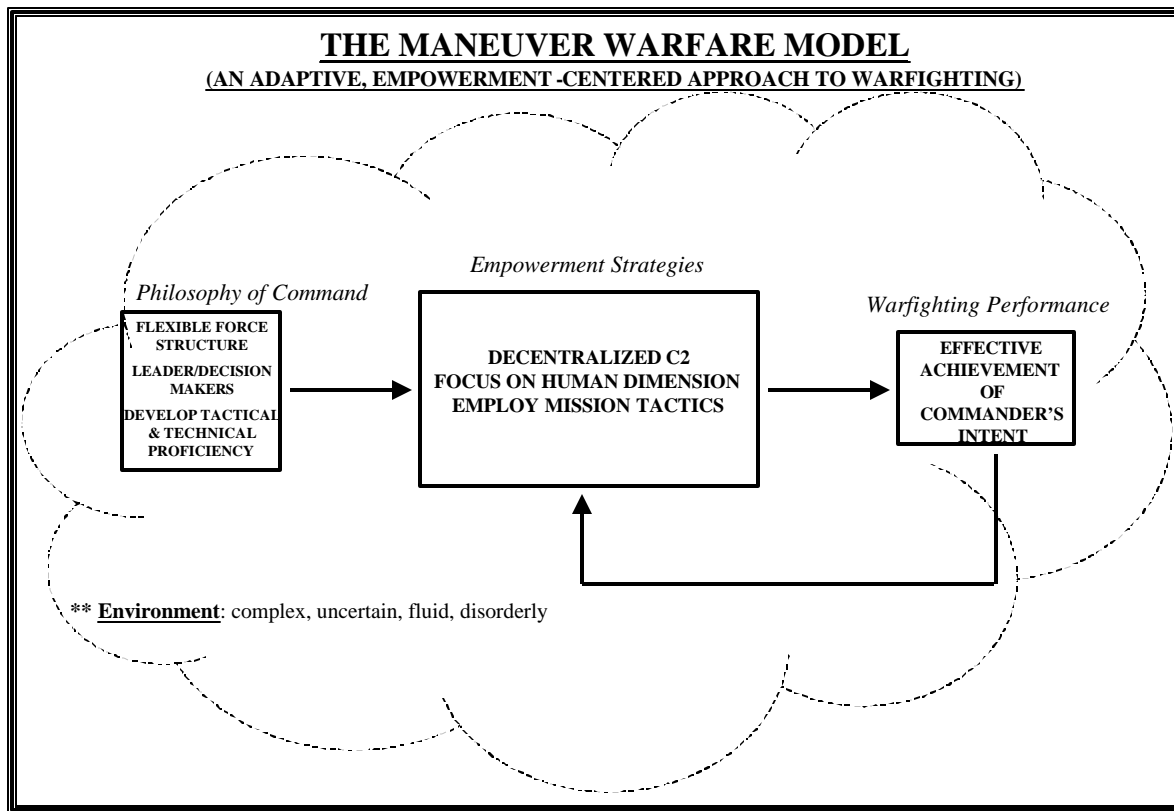


Exhibit 5.3

In the Maneuver Warfare Model, the maneuver concept of war is characterized as an adaptive, empowerment-centered approach to warfighting. In Maneuver Warfare, the inputs into the empowerment process are represented as three broad factors that encompass the Marine Corps' assumptions and beliefs about the way warfare should be conducted: the necessity to organize a flexible military force that is capable of responding to virtually any global crisis at any time; training competent leaders at all levels with the authority and ability to make sound decisions that may affect the entire force; and developing warfighters who are both tactically and technically proficient. Preparing a force based upon these assumptions has led to an empowerment-based strategy of warfighting.

The Maneuver Warfare model empowers warfighters through implementing practices that decentralize command and control functions, focus on the human behavioral aspects of warfare, and provide subordinate-lead decision-control through mission tactics. Finally, employing these empowerment strategies results in a high level of warfighting performance (organizational productivity) based upon measures

of merit expected from the original assumptions. Since adaptive organizations assume flexibility and human dynamics are paramount, the success of Maneuver Warfare is assessed in relation to the desired effects on the battlefield (the commander's intent).

b. Implications for Future Performance

Up to this point in the chapter, it has been postulated that Marine Corps doctrine emphasizes the implementation of empowering concepts: decentralized command, encouragement of initiative for decision-making to the lowest levels, operating as semi-autonomous units on the battlefield, and a concentration on personal leadership instead of process and technology management. Although all of these factors are important for the effective performance of forces on the battlefield, the Maneuver Warfare concept is one-dimensional (effects-focused) in its approach to achieving overall organizational productivity. Efficient methods of operation are secondary to the effective practices described above. As a matter of fact, emphasizing the technical practices intended to enhance warfighting ability over tactical reasoning is counter to Marine Corps doctrine and is strongly advised against (*Warfighting*, 1989).

However, the fact of the matter is that we are in the midst of a technological revolution where information pervades the surrounding culture. Just as key operations in the rest of civilian world have been affected by information technology, so is the military being affected. Senior military leaders are realizing the necessity to exploit the advantages of information technology to achieve potential benefits, resulting in operational practices that are more efficient. The research question revisited again is what happens to future warfighting performance when these two fundamentally different approaches to warfare are combined. The next sections discuss warfighting paradigms that account for the rapid advances in technology toward greater efficiency.

D. CONDUCT OF WAR: REVOLUTION IN MILITARY AFFAIRS

The Revolution of Military Affairs (RMA) concept of warfighting exists within the context of the requirements for the future, high-technology battlefield. Given the

principles of this concept of future warfighting⁶, the focus of this research will turn to examining the conduct of war within the RMA paradigm.

The current state of the national and international affairs has positioned the United States as the sole global super-power in the world. The fall of the Communist Bloc in Europe over a decade ago, catapulted the world into a frenzy of rapidly changing political imbalance. From this constantly changing, complex geopolitical environment emerges new foes with the potential to wage war. A strong and effective military force is still necessary to meet the future requirements of conflict and crisis. Yet, domestic leaders continue to reduce the operating budget that sustains the U.S. military force. To resolve this problem, the military leadership, realizing that the operational budget will only support a smaller force, sought to plan a force structure change that tailors a new military force capable of meeting today's challenges out of one that was designed to engage in a large-scale battle with the former Soviet Union Bloc (Alberts, 1996; Blaker, 1997). The objective of the force structure change is to create a smaller force that is more capable of meeting a wider variety of responsibilities.

At the same time that these global issues are forming, the U.S. experienced the largest economic boom in its history. Simultaneously, the nation is also experiencing a boom in IT utilization (Blaker, 1997). Many have attributed this considerable economic growth to the advancement in technology. If that is the case, then the U.S., as the preeminent developer of IT, should develop an ever-increasing military advantage over competing nations, if IT utilization is properly leveraged (Ullman & Wade, 1996). Thus, much like civilian organizations that are seeking to exploit the advantages of technology to gain a market advantage in a highly competitive industry, the military is also seeking the exploit IT to gain a competitive advantage in battle.

The result of these two requirements (the need to conduct force restructuring and the desire to exploit advances in IT) was the 1997 Quadrennial Strategic Review (QSR); a “gathering of the minds” conducted to discuss the nation's military needs for the 21st Century. Instead of deciding simply to shave down a military structured for the Cold War, the nation's leadership decided that it would be best to stage an in-depth study to

⁶ Appendix B: *Factors for Future Warfighting* describes a newly developed philosophy on warfighting as it relates to the nature, theory, and preparation for warfare on the future, high-technology battlefield. If the reader does not have a firm understanding of these concepts, it is suggested that Appendix B be reviewed before continuing. Throughout the remainder of this chapter, many ideas will be presented based upon an understanding of future warfighting doctrine.

develop a national consensus on what the military should look like in the future, and how it will meet future threats (Blaker, 1997). Here, the idea surfaced to attempt to develop a force that leverages the technology available in this nation to dominate any potential enemies. This cannot be accomplished effectively by just adding technologies to the military force, but it requires a significant redesign of forces and mental paradigm shift for leadership to embrace these rapidly evolving technologies (Ullman & Wade, 1996). What evolved was what is currently referred to as the Revolution in Military Affairs(RMA) concept.

1. What is *a* Revolution in Military Affairs?

Revolution in military affairs refers to the notion that technological changes coupled with new organizations and doctrine have transformed the character of warfare throughout history. This type of revolution includes extensive changes that occur relatively quickly in and have a dramatic affect on the broader society before they manifest into substantial alterations in warfighting practices. In the 1800s, the railroad and telegraph introduced a significant change in civilian culture and in the conduct of war. In the early 1900s motor vehicles, aircraft, and automatic weapons, had a similar affect on the civilian and military cultures. Even in the late 1900s, nuclear energy transformed the way people thought about conducting "business" (Blaker, 1997). These are all examples of how advances in technology affected the weapons, tactics, and doctrine of warfare; they constituted revolutions in military affairs.

Today, the modern world is in the midst of an information revolution; one in which technological concepts and systems have the potential to dramatically improve the performance of all types of tasks. Because computing and information technologies have already transformed the way that business is being conducted, the possibility exists for rapid advancing technologies to transform warfighting in the 21st Century (Blaker, 1997).

2. What is *this* Revolution in Military Affairs?

In present time, RMA refers to the initiative to develop and improve information and command and control capabilities needed to significantly enhance joint operations and dominate future adversaries (West, 1998). Admiral Cebrowski, the former Director of Space, Information Warfare, Command and Control for the U.S. Navy, declares, " this revolution in military affairs is driven by the seismic upheaval in information technology

that is causing a tidal wave of change throughout society" (as cited in West, 1998). The RMA concept seeks to apply functional technologies and concepts currently employed by the larger civil society to military warfighting.

Endorsed by the Chairman of the Joint Chiefs of Staff, General John Shalikasvili, and urged by the Vice Chairman, Admiral William A. Owens, at the conclusion of the 1997 QSR, the senior military leadership had come together to agree on a strategy. Senior leadership decided that it would be a wise idea to attempt to exploit technology and explore options of developing a smaller military force operating with advanced technologies (Blaker, 1997; FitzSimmonds, 1998). They recognized that advances in the ability to gather and process information could be tremendously beneficial in military operations.

The RMA force concept of employment that was proposed at the QSR would accelerate the trend toward interoperable ground, air, and maritime forces in order to facilitate better joint operations in the future. It also involves rapid and significant reorganization and widespread, accelerated integration of new technologies across the entire military force. It was projected that by the year 2007, the U.S. could create "a military force more capable of carrying out missions required to advance the objectives of U.S. foreign policy and better able to deter or fight the nation's conflicts (Blaker, 1997, p. 4). Meeting the objective of establishing a smaller, more potent military force, seeking the RMA concept of mobilization would be the best value for the allocated amount of defense expenditures. What would be created is an effective force with the ability to "communicate among agile forces, which, armed with new weapons, can respond with speed, accuracy, and precision, over greater distances" (Blaker, 1997, p. 3). These forces collectively are referred to as the RMA forces.

3. RMA Philosophy

The RMA philosophy includes the assumptions, ideas, and beliefs that form the foundation of the RMA concept. As previously explained using systems theory, the assumptions that define the RMA concept also drive the practices that define the conduct of war under this paradigm. The central idea of developing a RMA force is to exploit the potential of IT and the current U.S. advantage in IT development to tailor a military force of sufficient design, size, and operational doctrine that makes better more effective use of technologies. Creating such a military is made possible through force modernization,

which involves implementing and integrating newer technologies to improve the overall efficiency of warfighting. In an effort to institute a modernization strategy, the military must procure "technologies that allow existing military platforms to work together better, operate more efficiently, and employ deadly force at greater distances, speed, and with greater precision" (Blaker, 1997, p. 4). Thus, the RMA concept seeks to design a force structure based upon the assumption that technology can substitute for mass and numbers (FitzSimmonds, 1998).

Preparing a military force for war in the above manner is a very techno-centric approach to warfighting that focuses on the potential gains of improving warfighting processes through focusing on efficiency-enhancing methods as opposed to more effective methods. The basic assumptions that govern this concept are contrary to those of the Maneuver Warfare concept. In Maneuver Warfare, the emphasis is on effective leaders who can competently make important decisions and realize the potential strength of their people, whereas the RMA concept emphasizes the employment of efficient tools that improve warfighting procedures and realize the potential strength of advanced technologies.

At this point, the future of warfare is still not certain. It is not known what technologies will be available in the future, and which ideas and concepts will support them best, let alone if the current technologies will work as proposed. Therefore, military planners must continue to think of the RMA force as the notional representation of what the U.S. military forces could look like instead of a precise forecast of future forces.

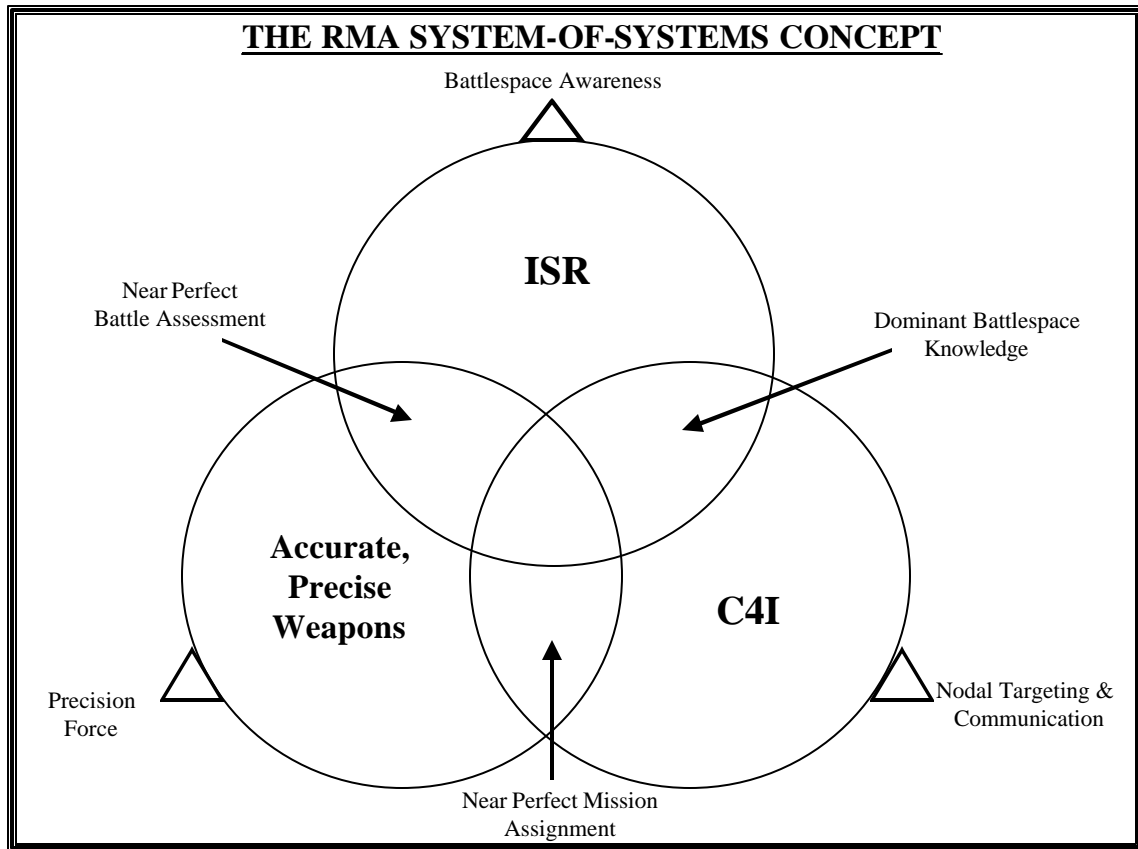
4. System-of-Systems Concept

Admiral Owens, champion of technological innovation, often refers to a "mosaic" of emerging technological advances in intelligence collection (ISR), information processing (C4I), and precision guided weapons that would ultimately present a different picture of U.S. military capability. Individually, each technological system brings great advances in military operation, yet together their interaction can bring revolutionary change in the way warfare is conducted. Admiral Owens speculated that integrating the subsystems into a higher system-of-systems would achieve dominant battlefield knowledge that would allow American forces to control the fog of war. When that knowledge is effectively communicated throughout the battlefield, forces are able to

"react to the battlespace with speed, precision, accuracy, and with devastating effect" (Blaker, 1997, p. 7).

In its infancy stages, the system-of-systems concept was but a mere theory based upon a set of assumptions until Admiral Owens created a program of systems prioritization and integration to set this concept in motion. Admiral Owens did not specifically articulate the vision of this new concept, however General Shalikasvili began to articulate a vague, yet more specific vision of how this system-of-systems is supposed to work in Joint Vision 2010 (JV2010), the concept publication that defines operational templates for the evolution of military forces in the future (Blaker, 1997).

The central idea of RMA is built on the technical foundation of implementing and integrating advanced military systems that give U.S. military forces an enormous military advantage over any potential foe. Thus, theoretically, U.S. forces will be able to apply a greater amount of force in a dramatically more efficient manner than any other opponent, with little risk to friendly forces. The integration and interaction between these newly implemented tools is referred to as the RMA system-of-systems (Blaker, 1997; FitzSimonds, 1998) and is represented graphically in Exhibit 5.4 below.



a. ISR

Intelligence, surveillance, and reconnaissance (ISR) collection includes the process of gathering data from sensors distributed from throughout the battlespace and combining that processed information with other sources of intelligence to create a virtual model of situational awareness. Commanders have a great need for time-critical knowledge about what is happening before, during, and after engagements. Due to advances in American military ability to collect relevant information through new collections platforms, today commanders can gain timely knowledge of the battlefield situation more quickly and easily (Blaker, 1997).

ISR collection leads to increased battlespace awareness (i.e., knowing where units, weapons, and soldiers are located in a particular area of operations). Military leaders must realize that it is not possible to get absolute awareness, for that would require that the fog of war be completely negated (*Warfighting*, 1989). However,

a force that employs advanced ISR procedures will be able to obtain such a comprehensive awareness of the battlespace that they will possess a dominant edge in it (Blaker, 1997).

b. C4I

Command, control, communications, computers, and intelligence (C4I) systems are employed to process the raw data collected from ISR systems into relevant information. Utilizing C4I systems enable faster, more efficient operations. The rapid advances in technology for these systems are propelling military operations towards real-time identification and position location of battlespace entities. Thus, the positive effects of C4I implementation include improved nodal targeting (identifying and targeting enemy positions) and advanced communication (ease of communication through multiple spectrums on the battlefield) (Blaker, 1997).

c. Precision Weapons

Precision weapons permit military forces to "apply the right kind of force, at the right time, against the right target" (Blaker, 1997, p. 10). A military force that employs precision weapons achieves battlespace dominance by imposing violent force throughout the battlespace with near-perfect accuracy. Thus, a precision force frames its operational scheme of engagement with deadly precision (Blaker, 1997).

d. Systems Integration

When the three components that make up the System-of-Systems concept (i.e., ISR, C4I, and Precision Weapons) are integrated, they form combinations of effects that will allow an RMA force to dominate a potential foe. Dominant battlespace knowledge is achieved when increased situational awareness within the battlespace results from relevant information provided by advanced C4I systems converted into a better understanding of battlespace events. The ability to access in real-time the results of precision engagements, results in near-perfect battle assessment. Furthermore, combining the effects of precision weapons with real-time targeting and communication yields near perfect mission assignment of RMA forces (Blaker, 1997). In general, the ability to identify and select targets better increases the leverage of precision-guided munitions; and a faster, more accurate method of battle damage assessment (BDA) makes

subsequent assaults more lethal (Alberts, 1996; Blaker, 1997). Consequently, conducting warfare in this manner would create an active cycle of increased military operations that render an enemy nearly helpless to an RMA force.

The key to the RMA System-of-Systems concept is the interoperability between the components, for it is the integration of these technologies that enables the leap in military capabilities. Independently, the effects of each subsystem result in significant increases in operational performance. However, integrating their effects results in the overwhelming power of the system-of-systems that will allow a military force to absolutely dominate an enemy within a given battlespace.

The central idea in creating an RMA force is to attain the ability to adapt to highly complex situations better and faster than an opponent. Employing the RMA concept seeks the same goals as maneuver warfare, but through different methods of operation. The RMA concept seeks to out-perform the enemy by concentrating its efforts on improving warfighting practices with technological advances, whereas the Maneuver Warfare concept seeks the same result by implementing leadership strategies. The significance of the techno-centric system-of-systems notion is at the heart of the RMA concept, particularly since the system-of-systems framework adds substantial claim to a vague, hypothetical concept of potential viability.

5. RMA as a Controlling Notion

The aspects of developing and implementing an RMA force are concepts that are congruent with a more directive approach to operational performance. The technical focus of this warfighting paradigm seeks to acquire and maintain control of operational events within the complex, disorderly environment of combat. An RMA force relies on technology to improve the efficiency of military operations; therefore, efficiency-based measures of merit are used to quantify warfighting performance. Additionally, the tightly coupled linkage of all battlefield entities through advanced information technologies, without employing explicit distributed leadership strategies creates a potentially bureaucratic structure where near-perfect battlespace knowledge may enable increased, hierarchic control of subordinate forces.

Furthermore, the RMA concept can be interpreted as a form of attrition warfare where the massing of effects, enabled by technological equipment and corresponding concepts, has replaced mass and numbers. Just as attrition-based warfare focuses on

concentrating fires to dominate the enemy, the RMA concept also seeks to achieve precision concentration of firepower through utilizing technologically advanced systems; both require a process-centered approach to focusing on the means of warfare. Because RMA forces seek to gain control of events in a rapidly changing environment through radical management practices, the human behavioral aspects of warfighting are not the focus of this warfighting paradigm. Under this paradigm, technical, methodical, and efficient means are emphasized over implementing methods of effective leadership. Thus, the RMA concept in its approach to the theory of future war, methods of preparing for war, and standards of conducting war are reasonably similar to the controlling, process-driven techniques of Directive organizations.

a. The RMA Model

Applying the concepts of theoretical models developed in earlier chapters, the characteristics of the RMA System-of-Systems concept of warfighting closely resemble the attributes of other organizations within the Directive Configuration. The IT Implementation Model (a directive approach to organizational performance presented in Chapter 3) is provided again in Exhibit 5.5 as a comparative model for examining the RMA Model in Exhibit 5.6.

In the RMA Model, the system-of-systems concept of war is characterized as a directive, control-centered approach to warfighting. The requirements necessary to develop a RMA force are similar to the factors for conducting IT implementation. In order to achieve market dominance by exploiting technology, civilian organizations seek the integration of information systems, so a RMA force also seeks to implement and integrate advanced military systems. The integration of improved ISR collection procedures, advanced C4I assets, and precision munitions are the primary contributors to the development of the system-of-system concept. Proper implementation of these components also creates the basis of assumptions that will drive the way military operations are conducted and what measures are used to assess their performance under this paradigm.

Preparing a RMA force based upon these assumptions has led to a process-improvement strategy of war, where warfighting practices are enhanced as a result of utilizing technological advances. In the IT Implementation Model, organizations seek to improve their internal processes by leveraging technology to obtain

and share real-time market information so that better, more informed decisions can be made at all levels of the organization. The RMA concept also seeks to leverage technology to gain the same results: obtaining battlespace awareness and sharing battlespace knowledge in real time to enable rapid and precise engagement of the enemy. In the RMA model, the improved warfighting practices are represented by two types of factors; the three components of the system-of-systems approach that independently improve military operations, and the resulting factors from the integration of those concepts that significantly enhance the conduct of military operations.

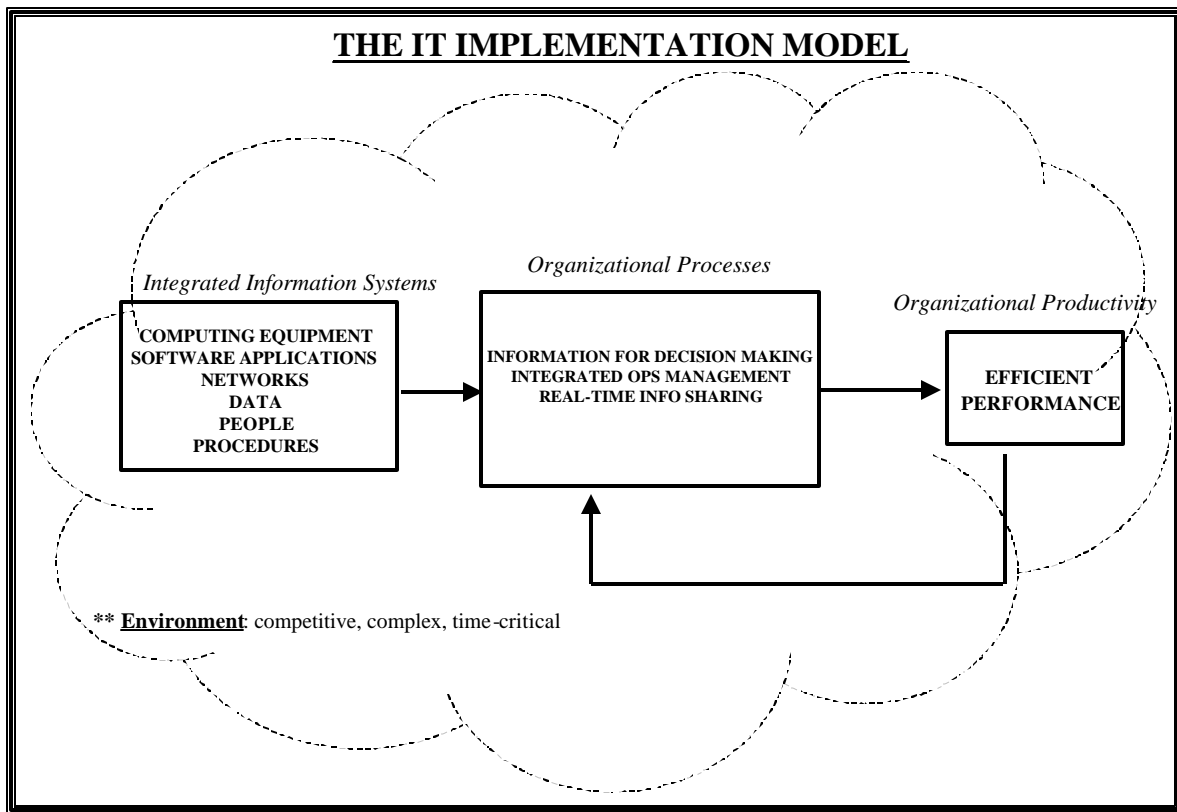


Exhibit 5.5

Finally, the practices employed under this paradigm have a directed affect on warfighting performance. Endeavoring to accomplish the RMA concept of warfighting theoretically results in a high level of warfighting performance (organizational productivity) based upon measures of efficiency defined by the original assumptions of the conduct of war in this manner. Since directive organizations seek to achieve control through efficient operations, the success of the RMA concept should be

assessed in relation to the desired amount of efficiency of the technical systems displayed during military operations.

b. Implications for Potential Operations

In this section, I postulated that the RMA System-of-Systems approach to warfighting requires an emphasis on control in a complex environment, which is enabled by conducting efficient practices through technological leverage: increases in operational tempo and speed of command; conduct of precision engagement of enemy targets; and establishment of extensive communication networks that enable far-reaching, real time

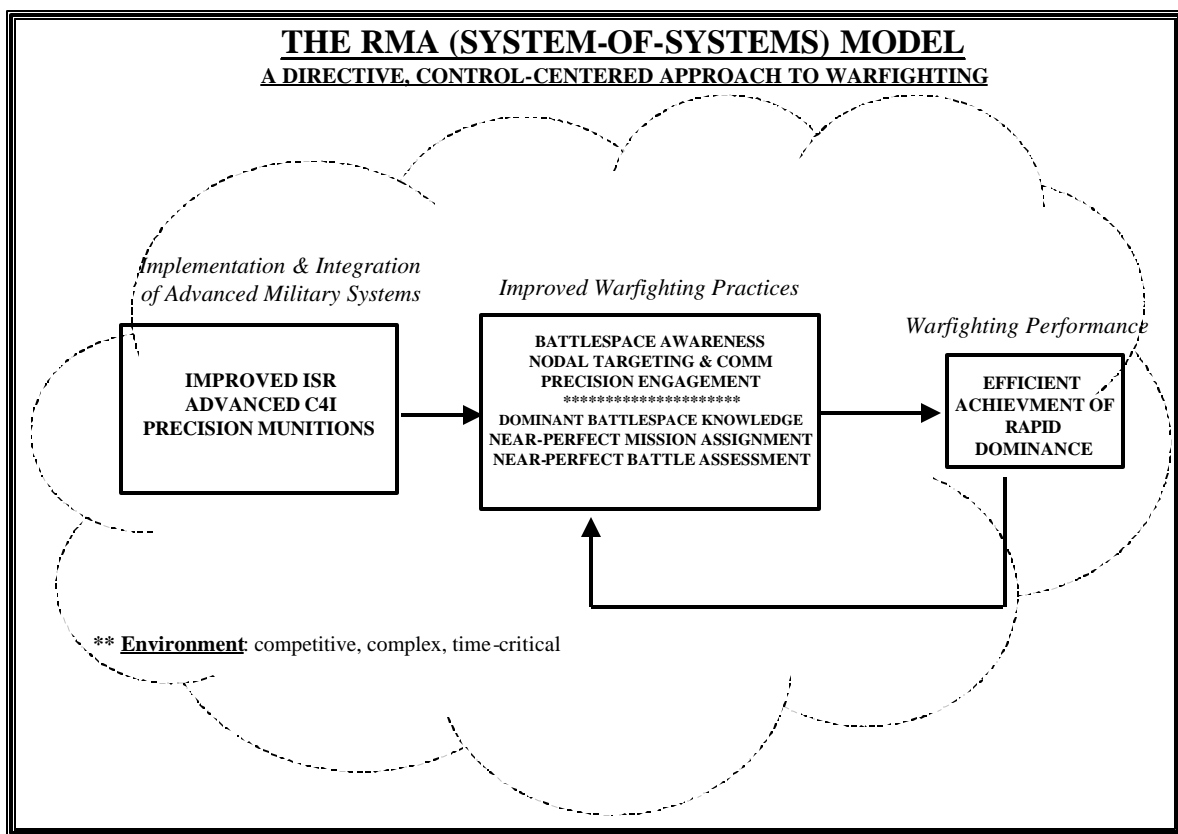


Exhibit 5.6

information exchange. The final result is an enhanced awareness of battlespace activities, which include exacting friendly and enemy location, accurate nodal targeting, precise engagement, and near perfect battle assessment, that allow an RMA force to exercise dominance within a given battlespace.

Although these factors are important in the efficient performance of warfighting, the RMA concept is a one-dimensional approach to achieving organizational productivity. Consistent with the beliefs of other directive organizations, effective methods of operation are secondary to the efficient practices described above, which is in contrast with the effective-focused approach of Maneuver Warfare. Is it possible that a warfighting paradigm exists that emphasizes the effective gains of an Adaptive organization, as illustrated by the Maneuver Warfare Concept, and the efficient benefits of the Directive configuration, as illustrated by the RMA Concept? If so, the question remains, what happens to warfighting performance when these two fundamentally different approaches to warfare are integrated into one warfighting paradigm. The next section explores the possibility of preparing, training, and deploying a military force that ascribes to a Generative approach to warfighting.

E. CONDUCT OF WAR: NETWORK-CENTRIC WARFARE

As has been stated, the modern world is currently in the midst of the Information Age when technologies have and will continue to drastically affect the way that people think, act, and live. Just as business, social, cultural, and educational practices have been affected by the dawning of the Information Age, the conduct of war will also be transformed. Throughout history, the conduct of warfare has been a product of the age in which it exists; the tools and tactics of warfare have always evolved along with technology (Alberts et al., 1999). Likewise, warfare in the Information Age will develop the characteristics of this age. What will distinguish future warfare from that of the present time is the method of employment of advanced IT systems and concepts that have already begun to radically change the civilian society. What follows is an examination of a warfighting paradigm that seeks to exploit the efficiency-oriented advantages of integrating advanced IT systems and effective organizational practices of Maneuver Warfare to achieve an optimal level of performance: Network-Centric Warfare (NCW).

In the commercial sector, new technologies are influencing the way that business is conducted. Dominant competitors have translated information superiority into competitive advantage by exploiting the power of IT to gain advantage in a competitive market. Given the advances and changes in the surrounding commercial society, it is inevitable that military practices will change also (Cebrowski & Garstka, 1998). The RMA concept and the Network-Centric Warfare concept are the two current theoretical

paradigms of future warfighting performance. NCW differs from the RMA system-of-systems concept previously presented. The NCW idea elaborates a technology-centered concept by integrating human and organizational behavior aspects, as well as addressing the concerns of doctrine, operations, training, and education required to turn concept into action (Alberts et al., 1999, West, 1998).

Today, several commercial organizations functioning in a competitive, rapidly changing, time-critical market environment have discovered the potential of exploiting IT and are adopting information-based strategies, along with empowering strategies to achieve a maximum (optimal) level of success. This is what the NCW concept seeks to achieve. Yet, since the concept of NCW is a theoretical warfighting paradigm based on limited observations of commercial organizations, some are skeptical about applying these concepts to the enigmatic conduct of warfare (Alberts et al., 1999). However, the relative environmental context in which both types of organizations function is very similar.

In this section, the new warfighting paradigm is explored as an optimal/generative approach to achieving organizational productivity. A detailed explanation of the theoretical or practical nature of NCW is outside the scope of this research. The intent here is to give a general description of the network-centric concept as it applies to this research, identifying key principles that are consistent with other ideas and concepts that have been discussed earlier in this thesis. It will begin by defining the concept of NCW and discuss the origins of the network-centric concept, the implications of those findings to military operations, and the transformation of the military into a network-centric enterprise. Then the key principles of NCW will be identified, the potential power and benefits of implementing such a concept will be discussed, and its characteristics described. Finally, the concepts of this new warfighting paradigm will be compared to the new management paradigm sought by generative organizations.

Most of the published material to date regarding the foundational principles of this concept is found in Alberts, Garstka, and Stein's (1999) *Network Centric Warfare*. Therefore, to substantiate this argument, most ideas will be pulled mainly from that source and other concept papers written on this matter.

1. NCW Defined

As was suggested in *JV2010* (1996), the principles employed by network-centric enterprises that allow them to leverage technology to achieve a competitive advantage, can be translated into operational doctrine for future military forces. Thus, the military can be viewed as a network-centric enterprise that conducts warfare as its business. The conduct of war under this paradigm is referred to as Network-Centric Warfare (NCW). The term NCW is used to describe the way future forces will be trained and organized to fight. In Alberts, Garstka, and Stein's *Network Centric Warfare* (1999), essentially the gospel for this relatively new notion, NCW is described as:

...An information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision-makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. (Alberts et al., 1999, p. 2)

In general, employing NCW concepts enables a military force to translate information superiority into combat power by establishing a robust network that links all knowledgeable entities in the battlespace.

NCW is a new warfighting paradigm that seeks to exploit the advantages of information technologies to develop information superiority, leading to battlefield awareness and later escalating to battlefield dominance. It is a conceptual framework for warfighting from which future military operations can be addressed, providing a fresh perspective to ensure new approaches and solutions are explored. While military forces are currently experimenting within the framework of this new concept, efforts are being made to harness the opportunities made available by implementing network-centric concepts to increased operational efficiency and enhance combat power effectiveness so that optimal desired results may be achieved.

NCW is not strictly a technology-based concept of operations; it is an evolving military response to how to effectively manage human and organizational behavior in the Information Age. "This is not about technology," declares Admiral Cebrowski, "It's about how you use it" (1997, p. 4). Thus, NCW is not focused on the ability of IT or network capability, but on what the network does -- enabling the rapid, real time

exchange of information so that empowered decision-makers can make better, more informed decisions during the complex act of warfighting.

2. Origins of NCW

As explained in great detail in Chapter 3, the current information revolution is transforming the modern society into an Information Society; one in which information systems and concepts are shaping the way that people live. Though this point has been made several times before, it may be necessary to review a few of the factors that affect organizations in this era. At the most basic level, information age technologies enable advances in speed and access, which result in broader access to information at increased speeds. Additionally, limits to the speed of operations are no longer constrained by time or space, because IT allows near real-time communication between organizations regardless of geographic location. Today, commercial organizations are leading the way in adopting Information Age concepts and technologies to create a market advantage (Alberts et al., 1999).

Because of the vast economic boom experienced in this nation, most commercial organizations are functioning in a highly competitive task environment. In an effort to remain competitive, these organizations realize that they must establish competitive advantage; that is they must alter their practices or implement new ones that will allow them to develop an edge over their competitors. Relying on the technological advances of this era, most information age organizations are trying to figure out how to leverage the power of IT to develop competitive advantage (Alberts et al., 1999). Following are the fundamental principles that need to be understood to develop competitive advantage.

a. Value Creation Process

Value creation is at the heart of developing competitive advantage. The value creation process is the method of examining how to improve the production value of an organization in order to increase overall productivity. It involves producing an attractive product or service and making it available in a timely manner at a competitive price. In today's market environment, information and IT are creating value for organizations in ways that were not possible before. One of the focal points of this research is to determine from where that value comes and how it can be quantified or measured.

b. Metcalfe's Law

In relation to evaluating integrated information systems, Metcalfe's Law provides an explanation about the potential power and gained advantage of IT. This law states "as the number of nodes in a network increases linearly, the potential *value* or *effectiveness* of the network increases exponentially as the square number of the nodes" (as cited in Alberts et al., 1999, p. 32). In other words, the more nodes that exist in a network, the greater the potential power of that network, because of the interactions between the nodes (Alberts et al, 1999; Cebrowski & Garstka, 1998).

c. Information Superiority

Information superiority is also a key component necessary to reach an advantage. In the commercial industry, the object is to approach the upper bounds of network power before the competitor to establish relative information superiority over others in the same work domain. Alberts et al. (1999) describe information superiority as "a state that is achieved when a competitive advantage is derived from the ability to exploit a superior information position" (p. 35). Thus, successful information organizations leverage a superior information position to create and maintain a competitive advantage over their competitors. But how is that superior information position obtained?

d. Network-centric Enterprise

To develop competitive advantage enabled by a superior information position, common themes have emerged among commercial organizations that are shifting from company-centric to network-centric enterprises. Network-centric enterprises are characterized by information-based strategies for creating and exploiting information technology. They begin with an extensive information infrastructure, or infostructure, that enables the processes, which improve competitive awareness of market environment to be shared throughout the organization (via networking). This, in turn, enables processes that exploit the newfound awareness to result in an improved "bottom line" or increased organizational performance. Thus, the power of the organization is in the network. It becomes a networked enterprise with the ability to share information across functional boundaries, which enables resource allocation decisions to be made

from an enterprise-wide perspective instead of from on functional perspective (Alberts et al., 1999; Cebrowski, 1997).

3. Implications of NCW-Implementation for Military Operations

If the theoretical concepts of NCW were actualized on the future battlefield, what would be the results, consequences, and outcomes for military practitioners? There are proven reports indicating the success that civilian organizations have achieved by exploiting IT to gain a competitive advantage within their task domain. Chapters 2 and 3 of this thesis provide substantiating evidence that organizations attempting to implement the two paradigms of empowerment and IT implementation achieve a high level of performance. Furthermore, in Chapter 4 concepts of the generative organization were presented, emphasizing both efficient and effective operations to obtain optimal performance. Using the "new management paradigm," these organizations seek to establish empowering, information-based strategies to achieve levels of performance not possible before. Therefore, although the NCW concept is based upon theoretical assumptions that have not yet been proven in battle, it is possible to explore the hypothetical implications of applying the theoretical paradigms above (network-centered operations) to a military organization.

a. Information Superiority

Just as private sector organizations achieve domination of their task domain through developing and exploiting competitive awareness, military organizations can achieve information superiority in military operations to develop the same type of battlespace awareness and resulting battlefield dominance. *JV2010* (1996) postulates that the ability commercial organizations possess to achieve information superiority through network-centric operations can be transformed into an operational concept for future warfighting. Information superiority in military operations is a comparative concept to developing competitive advantage in the commercial sector and, thus, is the goal for achieving full-spectrum dominance of the battlefield (Alberts et al., 1999; Cebrowski, 1997).

The military context of information superiority is described as:

The ability to collect, process, and disseminate an uninterrupted flow of information while exploiting and/or denying an adversary's ability to do the same. (Joint Pub 3-13, as cited in Alberts et al., 1999, p. 54)

Therefore, information superiority is both an active and passive notion, with the result of achieving it being an increased operational tempo and preemption of enemy initiatives. Obtaining information superiority increases the speed of command which creates new options for decision-makers, preempts the enemy's options, and improves the overall effectiveness of selected options (Cebrowski, 1997)

Information superiority is generated and exploited by adopting network-centric concepts, which allow organizations to achieve shared battlespace awareness and self-synchronization. The strength of information superiority lies in detecting, identifying, and sharing the information about any entity in the battlespace. Yet, the value of information superiority is not in itself; its true value is derived from the military outcomes that it can enable by making military operations more effective. In other words, the information-based systems and strategies employed by NCW are not its strength alone, but the options that they provide for a commander to dominate the battlefield are (Alberts et al., 1999).

This concept demonstrates an explicit regard to seeking efficient means (emphasized by Directive organizations) to accomplish effective ends (emphasized by Adaptive organizations). The focus is not on either result explicitly. However, both facets of performance complement each other to achieve organizational goals – dominant (optimal) performance on the battlefield.

b. Changing Battlespace

In addition to the current complexities experienced on the battlefield, American military forces of the future will face new challenges that will change the nature of the battlespace. Tomorrow's battlefield will be characterized by a constantly changing warfighting environment as the military is called upon more to continue to conduct a wide variety of non-traditional missions (OOTW); the emergence of Information Warfare (assault of the enemy's and protection of one's own infostructure); and the availability of weapons of mass destruction. The purpose of this research is not

to discuss the specifics of each possibility, but to point out that each of these issues and task environments will be included as military responsibilities in the spectrum of warfare. Therefore, future warfighting concepts and procedures will have to be applicable in all task domains, so that military forces can achieve successful performance even despite the complexity, chaos, and uncertainty of the situation (Alberts et al., 1999)

Additionally, it must be noted that the changing nature of war resulting in a changing battlespace will also change the types of measures and indicators of success necessary to evaluate warfighting performance. For example, measuring the amount of enemy casualties and collateral damage inflicted are not good indicators of success for a humanitarian assistance operation. The changing battlespace (task environment) will require new measures of success that determine how well the force is performing (Alberts, 1996; Alberts et al., 1999). Therefore, leaders must focus on the effective results achieved by military operations, as well as the efficient conduct of those operations.

4. Issues Affecting Command and Control

Command and control (C2) is a broad term that covers a multitude of activities within an organization from motivating individual players, to setting goals and objectives, to issuing task assignments, and assessing the performance of the organization (Alberts et al., 1999); C2 includes effectively leading subordinates and efficiently managing their tasks. In general, C2 usually refers to the iterative decision-making process that persists during warfighting. Decision-makers assign tasks or issue orders based upon available battlefield information. Then when they receive feedback from events in the battlespace, they combine that new information with practices to form corrective actions or initiate new orders. Warfare has always been conducted in a challenging task environment mired in the fog and friction of war. However changes in warfare brought about by the Information Age have established newer challenges to the command and control process.

a. Levels of War

Military has fundamentally separated the problems of engagement into three distinct areas of responsibility: the strategic, operational, and tactical level of war. Warfighting decision-makers have, up to now, dealt with the situations within their

assigned sector or theater of operations, usually set by geographic boundaries. Functionally, these decision-makers have dealt with specific tasks in a planned, sequential manner (i.e., offensive military operations have typically begun with the suppression of enemy air defenses, followed by achievement of air superiority, and then progressing to attack other targets deeper within the battlespace). However, the nature of the environment affected by the Information Age is making it more difficult to function in this manner. Compressing time and space, technology has knocked down the barriers between the strategic, operational, and tactical levels of engagement. In this new era, military forces must develop a coherent picture of the battlespace to focus efforts and fashion responses in a distributed task environment (Alberts et al., 1999).

b. Fog and Friction of War

The fog of war is the uncertainty about what is going on during the conduct of war, while friction is the difficulty experienced in translating the commander's intent into task performance. Fog results from a lack of battlespace awareness due to an inability to develop a coherent battlefield picture by incorporating situational knowledge about what is actually happening. Friction is a result of the inability to communicate or receive instructions based upon an insufficient distribution of battlespace awareness. Exploiting advances in the Information Age will help military forces reduce the fog and friction of war, or at least, operate more effectively within it. Future forces will need to share real-time knowledge in order to develop an effective common picture of friendly, enemy, and neutral forces on the battlefield to shape and form responses (Alberts et al. 1999).

c. Decision-making

Military forces of the future will have to rethink how they engage in the decision-making processes -- the way that they formulate solutions to basic military problems. Decision-makers that form solutions or determine options based solely upon past experiences are exercising programmed, "in-the-box" thinking. The problem brought about by the nature of warfare in the new era is that the old solutions may cease to be effective. Future warfare will require "out-of-the-box" thinking where new solutions to old problems are developed (Alberts, 1996; Alberts et al., 1999).

It has already been stated that the changes brought about by the Information Age will change the way that decisions are made in many ways. First, the compressed time-space continuum will allow for decision authority to be allocated to any level throughout the organization that is best able to deal with the situation. In addition, the establishment of information superiority allows new creative options to be selected more quickly, while at the same time limiting the enemy's options. Furthermore, the rapid exchange of real time information will dramatically increase the decision-making cycle. The new age has created an environment where collaborative decision making can be employed to increase combat power because of the distribution of battlespace awareness and knowledge throughout the organization (Alberts et al., 1999)

The new era has also transformed the task environment into one where static, linear events will disappear, requiring military forces to respond to a more simultaneous, non-linear battlefield. At the same time, the planning and execution cycle has become two distinct activities of war. Since efforts to speed up this cycle are reaching their natural limits and the requirements of the continuous battlefield are unyielding, future military forces may need to abandon the loop-concept of command and control and replace it with a new concept that recognizes the need to merge the planning and execution processes. This form of dynamic planning will lead to the integration of the planning (decision) and execution processes that constitute a seamless form of command and control (Alberts et al. 1999). Command and control can only be executed in this manner if the C2 node is closely coupled with the maneuver elements, which are closely linked to each other – networked in such a manner to facilitate the rapid retrieval and processing of information, so that rapid planning can be conducted, then tasks can rapidly be assigned and executed.

d. Structure

One way to make advances in C2 posture is by changing an organization's structure. The hierarchical command and control structure currently used by the military was instituted to accommodate the fog and friction of war, providing a span of control over a limited number of entities. The general rule of thumb regarding an effective span of control is five plus or minus two; meaning that a competent individual is expected to effectively be able to manage 3-7 other entities (e.g., sections, teams, subordinates, etc.). Placing intermediate leaders between the top of the organization and the implementers at

the bottom, in order to exercise an effective span of control has produced a middle management that is often an impediment to timely information flow. This slow speed of information flow will be inadequate in the Information Age (Alberts et al., 1999).

If an organization desires to develop competitive advantage through achieving information superiority, it must increase the span of control and reduce superfluous layers of middle management by implementing information-based systems and concepts that can accommodate the greater requirement (Alberts et al., 1999). Reducing the layers of management flattens the hierarchical structure and facilitates the increased flow of information.

For military organizations, a flatter command and control structure with an increased span of control can be established with an extensive data communication network that links senior headquarters to combat sensors and actors (warfighters and weapons). Eliminating the necessity for middle-levels of command makes the once pyramid-shaped command structure a flattened, mesh command structure, which eases the flow of information and corresponding decisions between seniors and battlefield actors. However, commanders must be careful that the change in command structure does not require only centralized coordination for the subordinate actor nodes, but instead creates a network of entities within a command that share battlespace knowledge equally. Given adequate training, each entity should have the ability to make command decisions that affect the battle based upon their firsthand knowledge of the situation and the key information provided through the network. (FitzSimmonds, 1998).

5. Shift to Network-Centric Operations

Throughout history, the limitations in communication systems and restrictions of information flow have resulted in a limited span of control which has perpetuated the need for distinct levels of war, as well as the corresponding information and decision authority granted within each. However in recent years, a blurring in the distinction between the levels of war has occurred. The advances experienced in the Information Age will reduce the technological constraints that framed the levels of warfare such that military forces will be free to organize and operate differently in the future. NCW brings significant improvements in operational capabilities that can dramatically impact the outcome of future military operations. These changes will enable commanders to alter their strategic and operational focus. By increasing battlespace awareness, creating

shared awareness, and ensuring accurate information is made available to those who need it most, military operations can achieve optimal results (Alberts et al., 1999; Fitzsimmons, 1998). As a result of this emergent Information Age, and the consequent publishing of the *JV2010*, both Joint and service doctrines are adopting network-centric concepts.

6. Key Concepts of NCW

The key of NCW is for military forces to improve battlespace awareness by increasing connectivity across geographic boundaries through the use of an extensive command, control, communication, computer, intelligence, surveillance, and reconnaissance (C4ISR) network capability. Developing this robust, multi-sensored information grid would provide dominant awareness of the battlespace allowing for the deployment of globally dispersed forces faster and more flexibly than an enemy can respond (West, 1998). Out of this, three basic components of the NCW concept must be emphasized: employment of a knowledgeable, geographically dispersed force of networked battlespace entities.

a. Geographically Dispersed Force

In recent history, the inability to communicate, move, or project force beyond the range of reliable communication systems required forces to be co-located, exercising weak geographic dispersal. This technical limitation also impeded a military force's ability to move rapidly throughout the battlefield, since a combat power unit could easily out run the range of communication of support and headquarters units. Information Age has enabled the combat power units to be separate from all other battlefield entities, eliminating geo-locational constraints and allowing forces to operate more effectively on the move. The advantages of this approach to warfighting include a shift from a concept of operations based on massing of forces to one that focuses on the massing of effects; the ability to concentrate effects without concentrating forces; and reduction of a reduced battlespace footprint, which also reduces risk to forces (Alberts et al., 1999).

b. Knowledgeable Force

Military forces that are networked to exchange real time information about battlespace activity are *knowledgeable* of the battlespace. Military forces operating under this paradigm are "empowered by knowledge, derived from a shared awareness of the battlespace and a shared understanding of commander's intent, [to] be able to self-synchronize, operate with a small footprint, and be more effective when operating autonomously" (Alberts et al., 1999, p. 91). Developing this type of force requires accurate, timely information and the information tools necessary to process battlefield information into context to turn it into battlefield knowledge.

c. Effective Linking Among Battlespace Entities

The power of the NCW concept lies in the ability to network battlespace entities to provide a common picture of the battlespace. Dispersed and distributed entities can generate synergy; the type of power that cannot be reproduced by controlling these agents. Further, through the establishment of a robust, high performance infostructure, all elements of the warfighting enterprise will have access to high-quality information that will allow them to make better decisions that result in more effective operational performance (Alberts et al., 1999).

7. Potential Power and Benefits of NCW

NCW focuses on the potential benefit of linking command, control, sensory, and engagement capabilities of all battlefield entities through a robust, digital data network that allows them to work together to achieve "synergistic effects." The source of the increased power of a network-centric organization is derived from the increased real-time information flow between the nodes in the network (battlespace entities), which enables shared battlespace awareness with increased quality. Networked battlespace entities will result in optimal performance through improved efficient and effective operations. Forces will be able to operate more effectively to achieve desired results when they exploit the power of the network to get more efficient use out of all battlespace entities. In a network-centric mode, near-real time information sharing between nodes (shared awareness) increases potential combat power. When shared battlespace awareness is exploited by linking C2 and other actor entities, it enables cooperative execution and self-

synchronization of forces (Alberts et al., 1999). Thus, the result is more effective and efficient achievement of desired results – a generative solution to organizational performance. Hence NCW combines the success of achieved efficiency and effectiveness presented in the earlier theoretical discussion to reflect the optimal performance desired of generative organizations.

a. Centralized vs. Decentralized Control

Skeptics of the NCW concept believe that the power of the network will result in greater centralized control (FitzSimmonds, 1998). They believe that linking all battlefield entities is a method of pooling and controlling decisions at one central decision-node. Adequate reason for this argument exists in examples from history.

In the early 1900s, the implementation of wireless radio drastically changed the face of warfare. However, it also threatened to change warrior culture of the naval service. A deeply rooted part of the naval ethos is autonomous command at sea. Up to that point in history, commanders were used to operating as autonomous commanders who could exercise unlimited independence at sea. Yet, the degree of centralized control offered by wireless communication systems threatened to change the philosophy of command. Commanders were then required to "answer" and "check in" with superiors at a much more increased rate than before. It was perceived that the radio denied commanders the critical initiative needed in combat situations, and imposed over control from decision-makers who were not in the immediate battlespace. Wireless communications did prove to reduce the autonomous authority of the commander. However, because of the technical limitations that plague current communication systems, commanders have still maintained most of their powers and decision-authority. But with the rapid, technological advances of today, it is hard to believe that future military communications will continue to be strained by technical limitation (FitzSimmonds, 1998).

As the increasing capability of data communication networks make it possible to improve the links among battlespace entities, the potential for centralized control increases even more. Many fear that wireless communication networks will enable a centralized philosophy of command where battlespace information is passed to central node for final decision-making or for decision approval authority (FitzSimmonds, 1998).

Consider this example: A single decision-maker has gathered the collective knowledge of other entities in the battlespace and attempts to make a decision based upon this knowledge. The central decision maker could make an "optimal" decision if he had a unified picture of the battlespace, provided by the network, **and** the necessary amount of time needed to process all of the transmitted information, then issue out individual targeting orders. In this manner, the network is being used for "information pulling" from the battlefield entities, to the central decision node. Information gathered from the network (sensor nodes) is pieced together to form a common picture of the battlespace to be re-distributed to the actor (shooter) entities. However, in battle, there is neither enough time nor enough information to operate in this manner, thus optimal decisions are rarely made by central decision-entities.

On the other hand, the true power of NCW is derived from the ability to empower all entities in the battlespace as decentralized decision-makers (Alberts et al., 1999; Cebrowski, 1997; FitzSimmonds, 1998). When the realities of the task environment settle in (fog, friction, complexity, uncertainty), senior decision-makers will be more inclined to use the network for its intended purpose; the objective being to empower all battlefield entities to decide and act simultaneously in order to mass effects, achieving shock and awe, in order to bring about a rapid conclusion of the engagement. (Alberts et al., 1999; Ullman & Wade, 1996)

Therefore, it would be correct to say that NCW can be an empowering concept that uses information-based practices to achieve its goals. Its intent is to provide "increased awareness for all players with more collaboration and decentralization in the form of self-synchronizing forces" (Alberts et al., 1999, p. 107). Furthermore, *JV2010* (1996) predicts that the results of the information network will be the decentralization of command authority with "individual warfighters...empowered as never before" (*JV2010* as cited in FitzSimmonds, 1998). "Decentralized empowerment" will be required for NCW. The expanded, rapid information flow resulting from network integration will permit decision-authority to migrate to the lowest echelons of command where timeliness is most important, increasing opportunities for initiative and independent operations to take place (FitzSimmonds, 1998). In the near future, it is conceivable that tactical level commanders can have as much understanding and awareness of the battlespace as operational level commanders currently have. As IT knocks down the barriers separating the levels of war, the warfighting responsibilities will have to be reallocated.

b. Results

Theoretically, the potential advantages of implementing NCW are great and are measurable in both areas of efficiency (performance of tasks quickly, inexpensively, and easily) and effectiveness (production or achievement of desired outcomes). The full integration of battlefield systems through a common information network results in at least three significant advantages: the networking of long range sensors and weapons (actors) for the simultaneous massing of fires on enemy targets; geographic dispersal allowed by long-range, wireless communication network resulting in greater force protection; and tremendous increases in operational tempo, including the decision making process (FitzSimmonds, 1998). The desired effects achieved by this concept include increases in responsiveness and tempo of operations, lower risks and costs, and increased combat effectiveness (Alberts et al., 1999). NCW enables the overall optimal performance of desired results; maximized potential efficiency to achieve maximized potential effectiveness.

8. Characteristics of NCW

Though many of the attributes of NCW have been explained above, and some are even inherent in the nature of the concept, the characteristics of NCW include those assumptions, beliefs, and ideas about how war is to be conducted within this paradigm.

First of all, it must be noted that NCW is still a concept. It is more a state of mind than a current reality at this point. No one really knows how to implement it yet, though the services are fervently attempting to learn more about the essence of this concept by conducting experimental exercises. Applying lessons learned from the civilian sector coupled with current knowledge of the nature of war still has military professionals seeking an understanding of the full potential of NCW. It may be some time before they find the answer (Alberts et al., 1999).

Nevertheless, changing it from an idea to a real operational doctrine requires substantial changes in the military way of thinking; the culture, organization, C2 structure, concepts of operation, organizational forms, force structure, and other issues need to be revisited. To reach its fullest potential, NCW must be deeply rooted into the operational art, meaning that new technologies cannot simply be applied to current equipment, doctrine, tactics, and organizations of warfare. There must be a co-evolution of organization, doctrine, and technology in the warfighting "ecosystem" to ensure its

success. This will lead to the emergence of new tactics, techniques, and procedures to conduct network-centric operations (Alberts et al., 1999).

NCW adapts to the nature of war. It does not seek to control or change the environment, but to work productively within it. Only the principles of mass and maneuver need to be revisited, as they will occur in a different manner, but the other factors of warfighting will remain the same (i.e., environmental context, spectrum of war, etc.). NCW improves the ability to operate within similar complex environments by reducing the amount of tension between the factors of complexities. Warfare has always been characterized by the complexities of war (friction, fog, disorder, etc.). Production of the near real-time picture reduces uncertainty tremendously, so that better battlespace awareness helps commanders shape the battle to their advantage (Alberts et al., 1999).

The NCW concept applies to the entire spectrum of warfare. It has the enormous potential to improve battlespace awareness, speed of command, and force responsiveness at all levels, including operations other than war. NCW also assists in meeting the full operational potential of the force. It will allow a military force to get the most out of its people and equipment, resulting in improved collaboration, speed of command, and employment of advanced technologies (Alberts et al., 1997). NCW does have the potential to improve overall warfighting performance, but leaders must remember that it is not a panacea.

9. NCW as a Generative Concept

Evaluating the components of the Network-Centric Warfare concept reveal that network-centric organizations maintain attributes that are similar to other generative organizations. Organizations that "fit" into the Generative organizational configuration, like military forces operating under the NCW warfighting paradigm, seek the same objective: optimal organizational performance through an emphasis on efficient and effective operations. Although NCW is depicted as a network-focused concept (FitzSimmonds, 1998), the central thought of the NCW is not about turning over the battle to the network, but "it is really about exploiting information to maximize combat power by bringing more of our available information and warfighting assets to bear both effectively and efficiently" (Alberts et al., 1999, p. 12). NCW is not just about the network, but it is mainly about the overwhelming advantage that the power of the network gives to a commander as he decides how to empower his subordinates to reach

their maximum potential; a combination of efficient management processes and effective leadership practices.

What should result is a networked military force of battlespace entities that exchange real time information to create a competitive advantage through information superiority that allows each knowledgeable entity to operate autonomously on the battlefield, armed with dominant battlespace awareness and the commander's intent, to make faster, better, more informed decisions – a generative approach to warfighting. Thus, consistent with the operational focus of the generative concept NCW seeks to achieve optimal performance by conducting efficient means to achieve effective ends.

a. NCW Model

Provided as tools for comparing and evaluating the NCW concept, Exhibit 5.7 is a duplicated representation of the Generative Performance Model presented in Chapter 4, and Exhibit 5.8 is a graphic representation of the NCW concept.

In the below exhibit, the NCW concept is characterized as a generative, network-centered approach to warfighting. NCW, like other generative organizations, seeks to achieve optimal organizational productivity in measures of both effectiveness and efficiency. Therefore, the corresponding practices should reflect those present in the Generative Performance Model.

Beginning with generative leadership and management ideas, the generative organization seeks to focus on both effective leadership and IT implementation at the onset. Likewise, the NCW concept seeks to focus on developing efficient means to achieve effective ends. The initial thoughts, assumptions, and beliefs about operating under this paradigm center on establishing a robust, extensive data

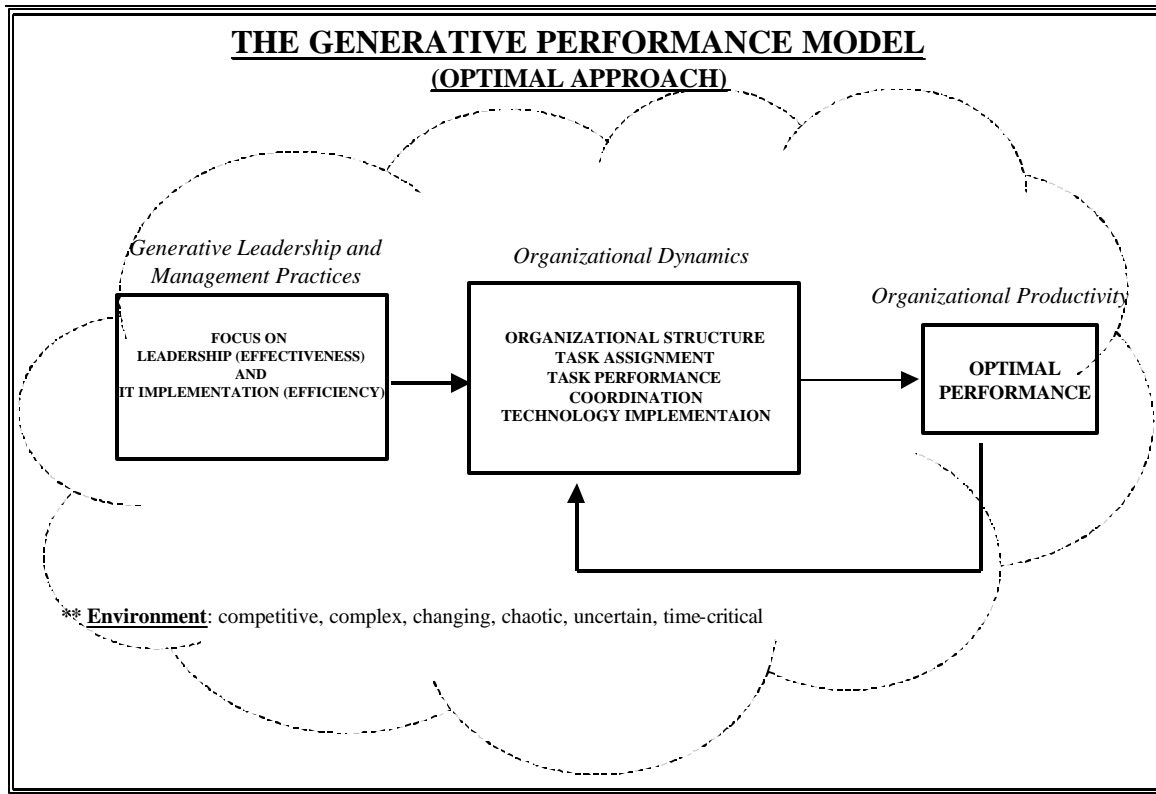


Exhibit 5.7

communication infostructue and developing dynamic approaches to command and control issues. Utilizing the infostructure augmented by the real time information sharing of knowledgeable battlespace entities would create dominant battlespace awareness as a result of the efficient exchange of knowledge. Altering the C2 structure (flattening the hierarchy), decentralizing command authority, and implementing a coherent, common picture of the battlespace are but a few examples of initiatives in granting decentralized empowerment to competent battlefield leaders.

In the Generative Performance Model, synthesis of the initial leadership and management ideas yield positive affects on organizational dynamics and processes that make the organization function. When implementing the NCW concept,

empowering and information-based strategies are implemented to improve the organizational dynamics: achieving battlespace awareness and implementing virtual organizations. Battlespace awareness is the result of linking all battlespace entities to achieve a level of dominant awareness by creating a common picture of battlespace activities. Virtual organizations bring the necessary people and processes together to accomplish a particular mission. Enabled by networking, Virtual Organization is merely a term to describe the combined effects of virtual collaboration (real time coordination between geographically dispersed forces) and virtual integration (real time operations with geographically dispersed forces), which leads to the self-synchronization of forces.

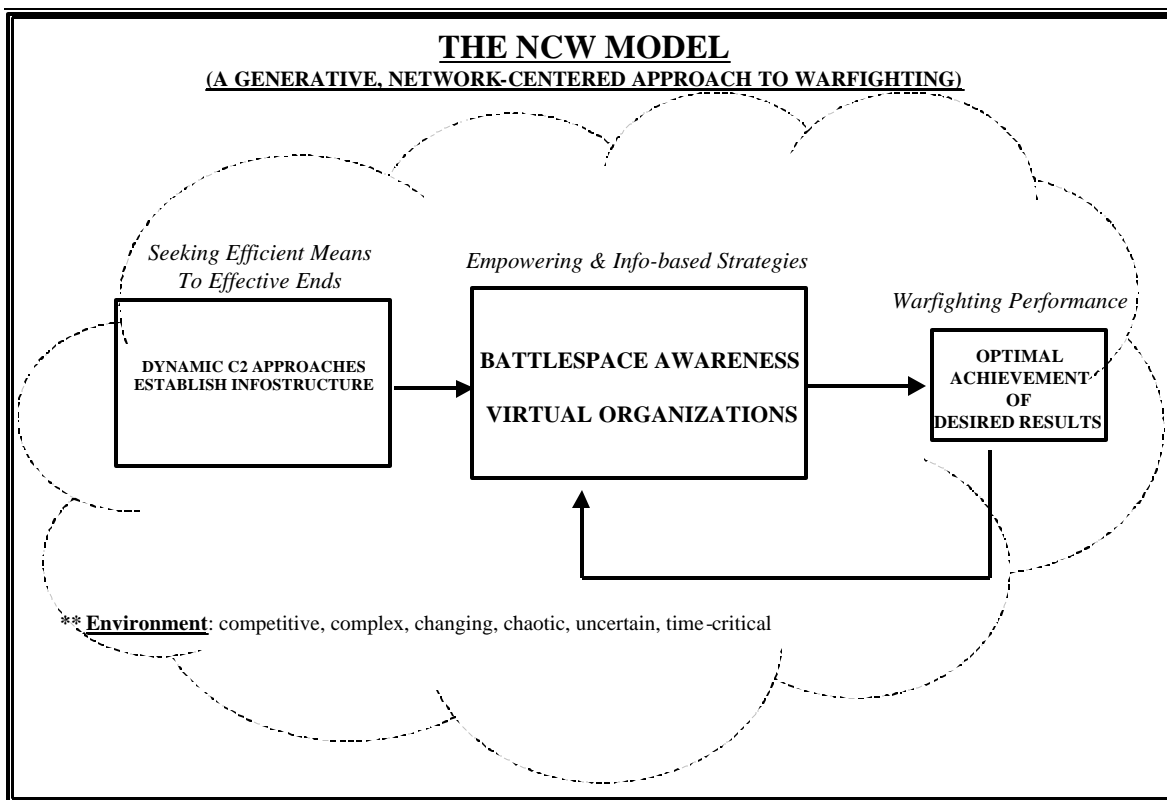


Exhibit 5.8

Finally, proper implementations of the empowering and information-based strategies that affect the organizational dynamics are predicted to yield an optimal level of warfighting performance. Since generative models start out with basic assumptions about the importance of efficient and effective operations, the practices that are conducted and the measures used to evaluate overall performance should, theoretically, emphasize both areas, unlike the previous two warfighting paradigms.

The NCW model, graphically represented in Figure 5.8, presents a framework that can be used to measure a military organization's progress towards achieving optimal results by assessing how well the organization is implementing the process dynamics (i.e., Battlespace Awareness and Virtual Organization). Here, the term "optimal" does not suggest "perfect" performance. In this model, optimal means achieving the highest possible results given the resources. Theoretically, a NCW force that correctly and successfully implements empowering, information-based strategies will achieve optimal desired results.

F. SYNTHESIS

The intent of this chapter was to examine warfighting performance and potential warfighting performance utilizing theoretical frameworks established in previous chapters and assess their viability. The three warfighting concepts that were reviewed were evaluated against criteria that accentuated subordinate empowerment strategies and information technology implementation. What follows is a synthesis of the presented material and a discussion for future consideration.

In review, the current Marine Corps doctrine of Maneuver Warfare emphasizes empowering principles (decentralized command, initiative in decision making to the lowest levels, semi-autonomous units operating on the battlefield, concentration on leadership vice technology, etc.) consistent with those of an Adaptive Organizational Configuration. Applied correctly within the correct task environment, Maneuver Warfare is a high-performance warfighting concept emphasizing operational effectiveness. The focus of Maneuver Warfare is not on operational efficiency – desired results are achieved, yet at the cost of time, material, and distance.

The RMA System-of-Systems concept is more of a Directive Organization approach to warfighting, seeking to acquire and maintain control of operational processes, even within a complex task environment. Like organizations in the Directive Organizational Configuration, the RMA concept seeks to develop control by implementing efficient organizational practices and procedures. In this case, efficiency is obtained by exploiting the power of advanced information technologies. This techno-centered warfighting paradigm, implemented in the proper environmental context could also achieve a high level of warfighting performance, in terms of operational efficiency. Efficient processes are measured in times, distances, and amounts (time on target,

distance between objectives, battle damage assessment), however, no measures exist to emphasize the effectiveness of the results. Therefore, the processes that “control” warfighting may be achieved on the battlefield, yet at the cost of achieving the overall desired results of the battle (i.e., complete destruction of the enemy).

Finally, the NCW concept of warfighting was discussed. NCW was described as a Generative model of warfighting placing emphasis on both efficiency and effectiveness through exploring a new way of thinking about the old problems. Still in an experimental state, if NCW was implemented in the task environment defined by the complexities of modern warfare, theoretically, the result would be optimal warfighting performance given the potential ability of the military force. In this model where optimal performance means achieving the maximum possible level of performance, optimal performance could be achieved, because Generative Organizations develop practices and measures based upon the initial assumption that efficiency and effectiveness are equally important dimensions of performance to achieve. The NCW concept integrates the emphases of Maneuver Warfare’s effectiveness through subordinate empowerment and RMA’s efficiency through information technology implementation to achieve overall optimal performance.

G. IMPLICATIONS

The characteristics of the Marine Corps, operating under the current doctrine of Maneuver Warfare, fall most closely into the Adaptive Organizational Configuration. However, the research points toward the notion that the changes in society affected by the information revolution will also affect the conduct of war. If warfare is inevitably going to be affected by the Information Age, then IT systems and concepts will most likely be necessary to operate successfully on the battlefield.

At this point, several research questions surface: First of all, given the characteristics of an Adaptive Organization and the strict Marine Corps doctrine, what will happen when IT systems and concepts collide with current practices? How is the Marine Corps preparing to conduct warfare in the future. Does the Marine Corps intend to apply IT to the current warfighting doctrine, creating a form of "Analyzer" hybrid that attempts to maximize efficiency and effectiveness (although, an Analyzer is less productive than an organization that operates on the extremes)? How will IT integration affect the human behavioral dimension of Marine Corps warfighters – their

empowerment? **Or**, will the Marine Corps advance beyond simply adding IT to current practices, and seek a new warfighting paradigm that exploits the advances in IT to empower its subordinates like never before?

The Marine Corps has the potential to meet optimum performance through attempting to achieve a generative approach to warfighting. However, this would require a substantial leap in the assumptions, beliefs, and practices of war. Since the NCW concept is a new concept, it requires experimentation to determine its viability. That is why the military services are currently conducting warfighting experiments with potential concepts and technologies to develop a warfighting approach for the future. This research seeks to study and evaluate the Marine Corps' current implementation of future warfighting concepts in relation to the theoretical warfighting paradigm that offers the greatest potential in operational efficiency and effectiveness: Network-Centric Warfare. The final results and conclusions of this research as it relates the theoretical framework that has now been established are presented in the final chapter.

VI. CONCLUSIONS AND RECOMMENDATIONS

This final chapter re-emphasizes the central purpose of the thesis by reviewing theoretical concepts presented throughout the work, answering the initial research questions of this study, and offering comprehensive conclusions relating to the research conducted. Finally, it concludes with recommendations for applying a viable method of measurement and evaluation of NCW as it impacts the empowerment of the warfighter.

A. SUMMARY OF RESEARCH

The objective of this thesis was to answer a series of research questions that examined the relationship between warfighter empowerment and the network-based military operations concept, Network-Centric Warfare (NCW). This research was shaped by an exploratory study of the theoretical concepts of organizational performance, an examination of current and future warfighting concepts, and an assessment of the practicality of successfully implementing future warfighting concepts. The focal point of study was on the relationship between Marine Corps *warfighters* and their *warfighting* practices. Limited in scope to U.S. Marine Corps applicability, throughout this thesis, *warfighters* were considered military personnel who have been taught and trained to operate as U.S. Marines, have been given the authority to make decisions, and are in a position to implement actions conducted at the operational and tactical levels of war. Additionally, *warfighting* referred to the doctrine, techniques, and practices of a military force to conduct, prepare, and train for war. For this thesis, the specific use of the term *warfighting* referred to a Marine Corps unit's execution of current Maneuver Warfare doctrine, techniques, and practices; or its feasible implementation of RMA or NCW concepts, tactics, and procedures on the future battlefield.

In review of the above information, a synopsis of research results are provided in relation to the fundamental research questions originally identified.

1. Empowerment Theory

One of the primary inquiries of this research was to explain the phenomenon of leadership/subordinate empowerment – what empowerment is, why empowerment should be used, and the results derived from empowering strategies. Furthermore, this study

sought to resolve how empowered individuals are developed and how well empowered individuals and empowerment-enhancing organizations perform relative to others. Finally, an important question relating to this issue was whether military organizations, particularly the Marine Corps, embrace, utilize, and/or train towards empowerment strategies.

a. What is Subordinate Empowerment?

Several formal definitions of empowerment were presented and each reflected that leaders/managers recognize the worth and knowledge of their employees and get them involved in the operations of an organization by giving them the authority to actively participate in the decision making process. Thus, it capitalizes on the employees' perceptions of influence and feelings of ownership within the organization and generates improved organizational procedures. The working definition of empowerment was:

Enabling subordinates in such a manner that they perceive that they have the authority (choice) and ability (competence) to make important decisions (meaningfulness) and to determine the effect of those decisions (progress) on their personal livelihood, the livelihood of anyone within their sphere of responsibility, or the operation of the organization as a whole, resulting in an overall high level of performance for the entire organization (Block, 1987; CBCA, 1996; Shadur et al, 1999; Sirkin, 1993; Thomas & Velthouse, 1990).

b. What Are the Implications of Empowerment on Organizational Performance?

Employee empowerment does work. It increases employee involvement, activity, and participation in the workplace, which also leads to increased organizational performance. Additionally, empowered employees take ownership of their work, feel like they are a part of the "grand scheme" of things, and, therefore feel responsible not just for their job, but for making the whole organization work better. Individuals and teams alike are constantly working together to achieve higher levels of productivity within an empowered organization. There are literally hundreds of organizations that subscribe to the empowerment notion and have benefited greatly from its effects. Crosby (1992) conducted research on over 500 U.S., Canadian, and British organizations and

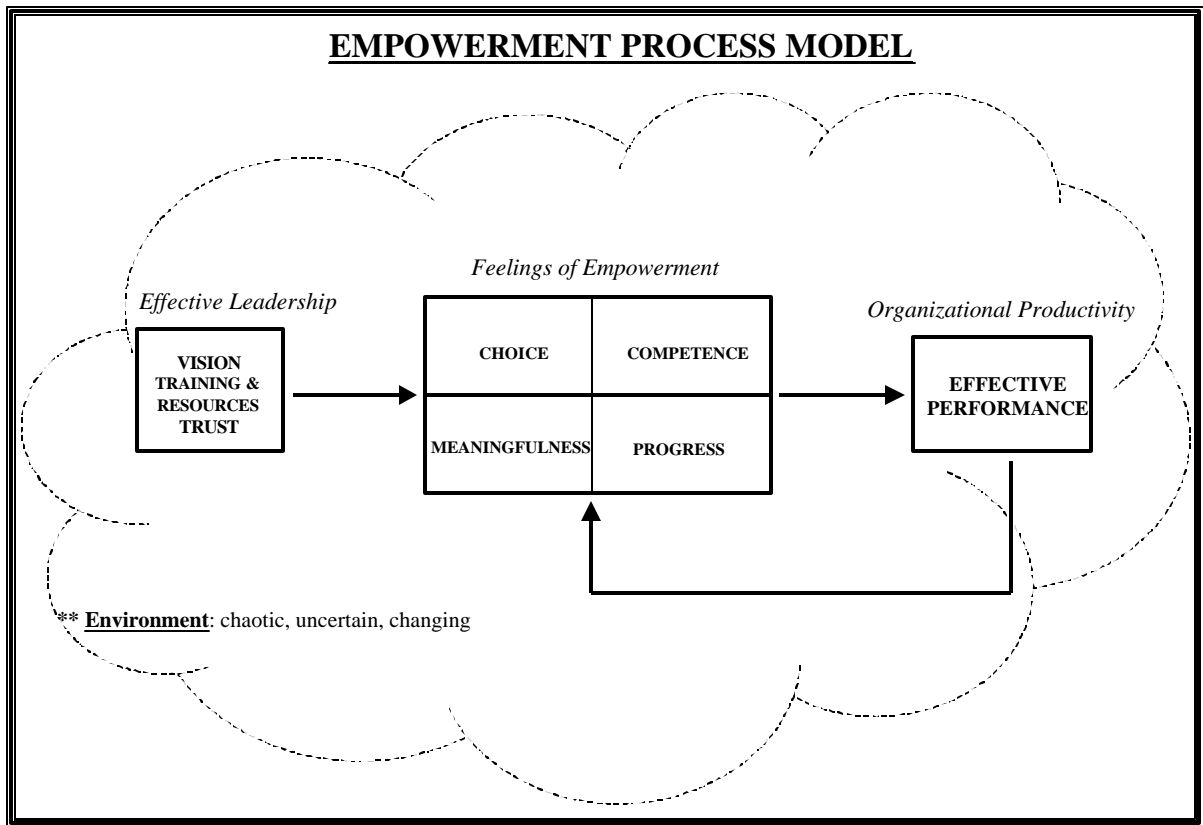


Exhibit 6.1

concluded that organizational productivity does increase when empowerment is implemented appropriately.

The theoretical framework that was modeled and established to assess the empowerment process in latter portions of the research paper is presented in Exhibit 6.1. It is a graphic representation that synthesizes the theoretical concepts presented earlier to provide a simplified approach to evaluating the empowerment process.

The Empowerment Process Model describes today's organizations that are operating in a complex, volatile, uncertain environment, and requires effective leadership to cope with the changes within the environment. In those organizations, effective leadership yields subordinates who experience feelings of empowerment, who in turn work for the organization in a manner that generates increased productivity. These organizations are said to have achieved highly effective performance. Increased organizational productivity adds back to the positive feelings of empowerment through

knowledge of progress, validated competence, increased confidence in choice, and pride in the task accomplishment, which continually yield high organizational productivity.

c. *Which Organizational Configuration fits an Empowerment-Enhancing Organization?*

Organizations that benefit from effective leadership practices and empowerment-enhancing strategies fit into the Adaptive Configuration. Organizations modeled after the Adaptive Configuration, also referred to as Adhocracies or Innovative Organizations, seek to optimize organizational effectiveness with little or no emphasis on efficiency. These organizations attempt to achieve organizational effectiveness by *adapting* to the external environment.

The two main principles of Adaptive organizations emphasize decentralized decision-making and innovative thought. These organizations rely on both members' knowledge and initiative to achieve productive adaptations and innovations in services. An organization can take advantage of this type of approach when innovative decisions are identified and acted upon by those members at lower levels in the organization. The goal of Adaptive organizations is to enable flexibility, creativity, and exploration; to abandon rigid adherence to internal order and control. Adaptive organizations do not seek to control their members, but to engage them in the organizational activities, which will produce greater results. The Adaptive Configuration is best modeled in environments where managers are unable to prepare for conditions that cannot be foreseen and where the organization must master new ideas under conditions of dynamic change. This configuration is most prevalent in dynamic and complex environments.

Based upon the principles of the Adaptive Configuration just mentioned, the Empowerment model presented earlier in this research is a key process used by organizations in this configuration. The Empowerment model focuses on the organizational intentions, or the organization's overall desired ends, with little focus on the means by which the ends are achieved. Furthermore, this model seeks to attain mastery of the external environment by employing effective leadership practices, which is also consistent with the ideas of the Adaptive Configuration. Flexible, adaptive, and innovative, the Empowerment model embraces the "new management paradigm" of employee empowerment, giving subordinate members the ability and authority to make decisions that affect the organization. Organizations that employ the Empowerment

model seek to achieve positive, long-term effects; the result of which is increased organizational productivity in the form of effective performance, however, at the expense of efficiency.

d. *What is the Applicability of Empowerment to Marine Corps Warfighting?*

The theoretical framework above was established based upon a substantial literature review of principles, theories, and prior research applicable to civilian organizations that operate in an environment of complexity, chaos, and uncertainty. When conducting warfare, military organizations, specifically the U.S. Marine Corps, operate in an extremely hostile environment characterized by the same environmental attributes of complexity, uncertainty, and chaos. Therefore, it was postulated that the principles of this model could also be applied to evaluating military organizations.

The aspects of Marine Corps warfighting as explored throughout this research (in accordance with *FMFM 1: Warfighting*) appear to parallel concepts expected of organizations that adhere to an adaptive approach to performance. The principles of the Marine Corps' method of conducting warfighting, Maneuver Warfare, are consistent with the flexible, creative, and innovative techniques of Adaptive organizations. The practitioner of Maneuver Warfare accepts three fundamental concepts in its operation: decentralization of command, a human behavioral focus vice technological focus (e.g., leadership vice management, ends vice means, and effectiveness vice efficiency), and the ability to function in chaos. These concepts require competent demonstration of flexibility and adaptability. Military engagements are planned and executed using mission tactics, which empower subordinate leaders to exercise individual initiative and decision-authority within the bounds of a senior's prescribed vision. Thus, decentralized empowerment leads to rapid execution of the decision-making process, which allows forces to out-pace the enemy and eventually break his will. The result of organizational productivity under this warfighting paradigm is an effective achievement of the commander's intent, focusing on the attainment of desired effects, instead of seeking quantifiable measures of efficiency.

The characteristics presented by the Marine Corps' implementation of the Maneuver Warfare concept are closely aligned and most compatible with the Adaptive Configuration. Exhibit 6.2 is a graphic representation of the Maneuver Warfare doctrine

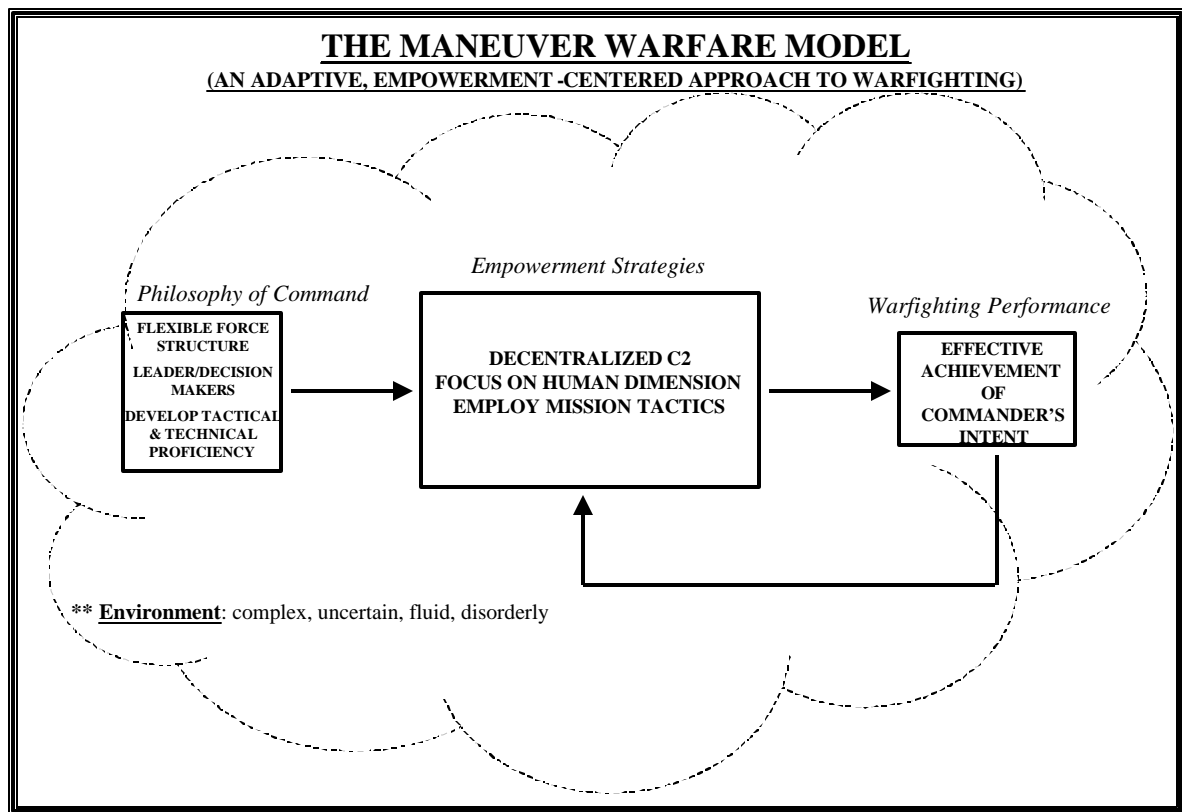


Exhibit 6.2

as an adaptive, empowerment-centered approach to warfighting and can be compared to the Empowerment Process Model in Exhibit 6.1

In the Maneuver Warfare Model, the maneuver concept of war is characterized as an adaptive, empowerment-centered approach to warfighting. In Maneuver Warfare, the inputs into the empowerment process are represented as three broad factors that encompass the Marine Corps' assumptions and beliefs about the way warfare should be conducted: the necessity to organize a flexible military force that is capable of responding to virtually any global crisis at any time; training competent leaders at all levels with the authority and ability to make sound decisions that may affect the entire force; and developing warfighters who are both tactically and technically proficient. Preparing a force based upon these assumptions has led to an empowerment-based strategy of warfighting. The Maneuver Warfare model empowers warfighters through implementing practices that decentralize command and control functions, focus on the human behavioral aspects of warfare, and provide subordinate-lead decision-control through mission tactics. Finally, employing these empowerment strategies result

in a high level of warfighting performance (organizational productivity) based upon measures of merit expected from the original assumptions. Since adaptive organizations assume flexibility and human dynamics are paramount, the success of Maneuver Warfare is assessed in relation to the desired effects on the battlefield (the commander's intent).

2. Information Technology

Another theme that propelled this research was explaining how rapid and critical advances in information technology have changed the world in which we live, and how those changes may affect military warfighting in the future. This study defined information technology, addressed the question of how IT implementation affects organizational productivity, postulated about the implications of IT advances in future warfare, and discussed how IT can be exploited to achieve battlefield dominance in the future.

a. What is Information Technology?

Information technology is defined as the concept of integrating advanced computing technology with information processing to improve efficiency of performance. Using the latest advances in technology, IT systems take in data (input), manipulate the data to provide meaning to it (process), possess the ability to present the information in some useable and relevant form (output), and store the results for potential use during future situations (storage). This is a much more efficient means of conducting business, by reducing the time it takes to make decisions based upon the available data.

A form of process management and process improvement, IT implementation focuses on the efficiency of operations; on the means, rather than ends. Information technology systems can be used as management tools to help manage complexity. As processes get more difficult and data continue to be abundant, advanced IT systems will be used to improve organizational performance. The new management paradigm brought about by the Information Age focuses on IT implementation: gathering, processing, managing, and utilizing information to bring about better operational decisions through the technical innovations in equipment.

b. What Are the Implications of IT-Implementation to Organizational Performance?

For the past 20 years, companies that have invested heavily in IT have generally shown a steady rise in profitability. Information technology is the fastest rising corporate expense today, because global companies have realized that implementing IT through investing in integrated information systems increases organizational productivity (Forbes, 1998).

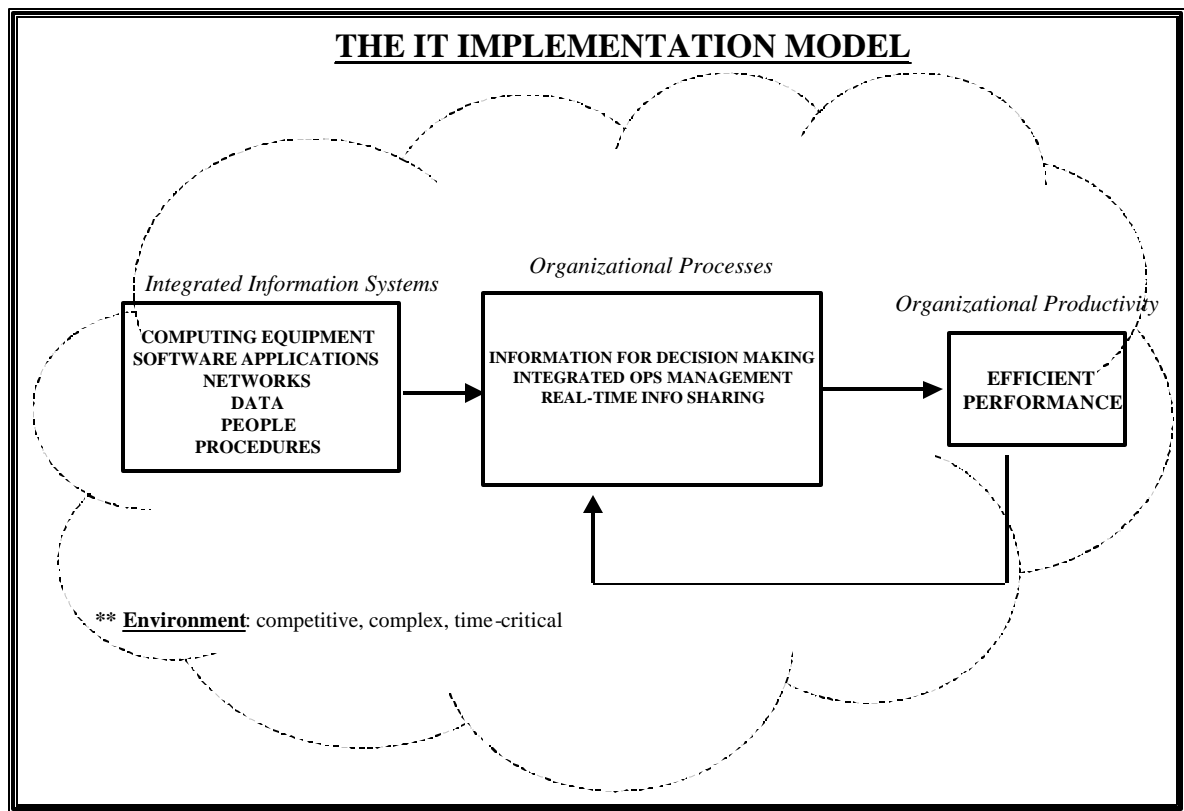


Exhibit 6.3

The theoretical framework that was modeled and established to assess the integration of advanced IT systems in later portions of the research paper is presented in Exhibit 6.3. The Exhibit is a graphic representation that synthesizes the theoretical concepts presented earlier in the thesis to provide a framework for the assessment of the IT implementation process in military organizations.

The IT Implementation Model assumes that today's organizations are functioning in a complex, competitive, and rapidly changing environment, and require improved

management techniques to bring order to their operations in the midst of chaos. The complexities of the environment can be better managed by implementing viable IT systems. Correct IT implementation yields improved organizational processes that, when properly executed can affect organizational productivity in a positive manner (i.e., successful use of integrated information systems yield relevant/quality information used to generate more informed decisions based upon real time data from all areas of the organization, resulting in efficient organizational performance). Consequently, the increase in organizational productivity, manifested as efficient performance, affects the way organizational processes are executed in the future (process improvement).

c. What Organizational Configuration fits an IT-Enhanced Organization?

Organizations within the Directive Configuration, or Machine Bureaucracies, resolve the tension between achieving organizational efficiency and effectiveness by focusing on achieving optimal efficiency, and devote less attention to effectiveness. The organizations that function under this paradigm are analogous to a well-oiled machine where the organization's people, processes, and procedures (its internal mechanisms) are rigidly controlled. The focus is on maintaining internal order of all dynamics within the organization, thus requiring strict management techniques. Organizations that attempt to benefit from the implementation of an austere information technology plan to improve the efficiency of organizational processes fit into the Directive Configuration.

The Directive Configuration emphasizes centralized control of the organization and standardized routines to simplify work tasks. Senior managers are the locus of decision-making and make all final determinations on courses of action; thus, reducing errors and perpetuating routine. Innovation and flexibility are constrained in this configuration. However, when change does come, these types of organizations use top-down modifications of their standard procedures to adjust to the change. In this configuration, organizations seek to master their internal processes to ensure that smooth, uninterrupted, efficient operations are maintained.

The IT Implementation model described in Chapter 3 fits the Directive Configuration. Investing in IT systems is a management practice that concentrates on the means; it seeks to improve internal processes to achieve a mastery of internal organizational activities. The focus of IT integration is to help the organization achieve

greater organizational efficiency; to master the organization's complex processes by utilizing systems that can provide better control and maintenance of organizational activities.

d. What is the Applicability of IT to Marine Corps Warfighting?

The model of IT implementation presented above, based upon principles, theories, and research obtained from an extensive literature review, is a representation of how corporations that function under competitive, complex, and rapidly changing market conditions have exploited IT to increase productivity and gain a market advantage. When the military is engaged in warfighting, it is operating in a volatile, competitive, complex environment, analogous to a corporation functioning in its competitive market. Therefore, I speculated that the principles of the IT Implementation Model abovementioned could be used to assess the Marine Corps' utilization of IT tools during warfighting on future battlefields.

The aspects of developing and implementing an RMA force are concepts that are congruent with a more Directive approach to operational performance. The technical focus of this warfighting paradigm seeks to acquire and maintain control of operational events within the complex, disorderly environment of combat. An RMA force relies on technology to improve the efficiency of military operations; therefore, efficiency-based measures of merit are used to quantify warfighting performance. Additionally, the tightly coupled linkage of all battlefield entities through advanced information technologies, without employing explicit distributed leadership strategies creates a potentially centralized structure where near-perfect battlespace knowledge has the potential to enable increased control of subordinate forces.

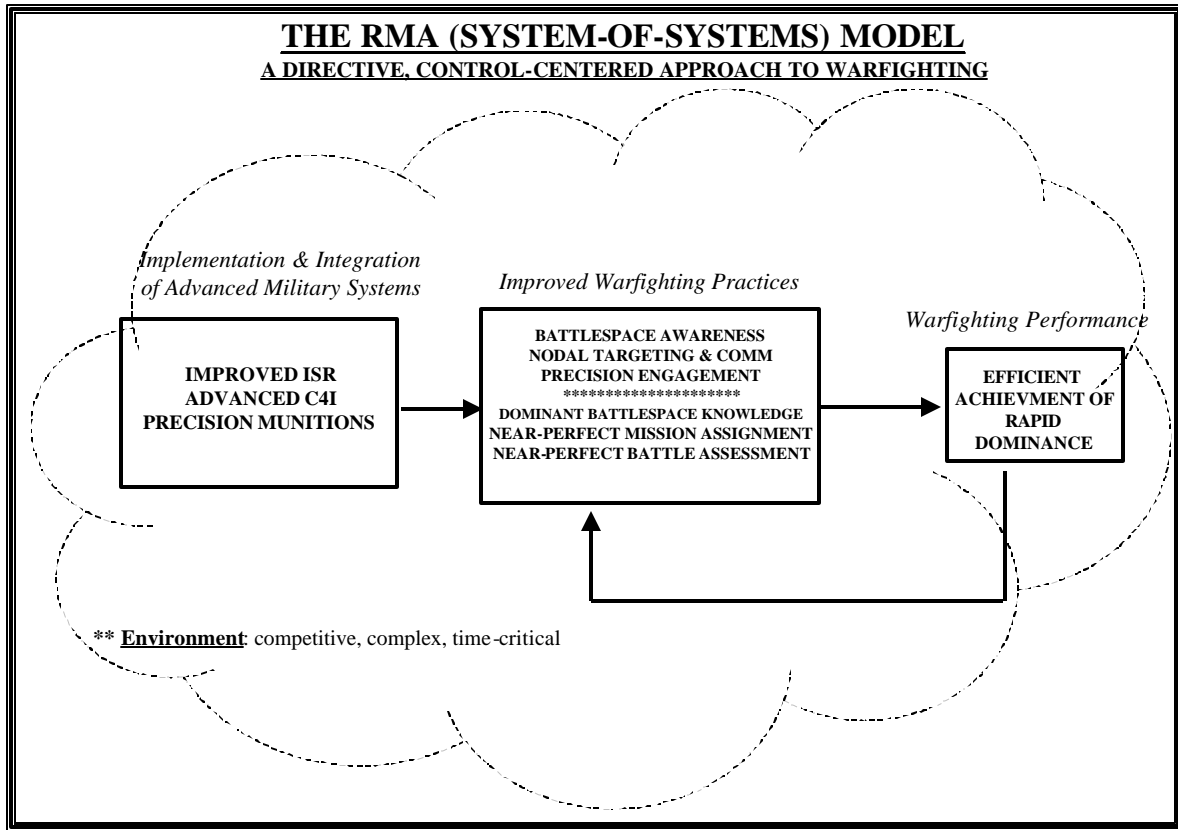
Furthermore, the RMA concept can be interpreted as a form of attrition warfare where the massing of effects, enabled by technological equipment and corresponding concepts, has replaced mass and numbers. Just as attrition-based warfare focuses on concentrating fires to dominate the enemy, the RMA concept also seeks to achieve precision concentration of firepower through utilizing technologically advanced systems; both require a process-centered approach to focusing on the means of warfare. Because RMA forces seek to gain control of events in a rapidly changing environment through radical management practices, the human behavioral aspects of warfighting are neglected. Under this warfighting paradigm, technical, methodical, and efficient means

are sought over implementing methods of effective leadership. Thus, the RMA concept in its approach to the theory of future war, methods of preparing for war, and standards of conducting war are reasonably similar to the controlling, process-driven techniques of Directive organizations.

The characteristics presented by the RMA System-of-Systems concept of future warfare are closely aligned and most compatible with the Directive Configuration. Exhibit 6.4 is a graphic representation of the RMA concept as a directive, control-centered approach to warfighting and can be compared to the IT Implementation Model in Exhibit 6.3.

In the RMA Model, the system-of-systems concept of war is characterized as a directive, control-centered approach to warfighting. The requirements necessary to develop a RMA force are similar to the factors for conducting IT implementation. In order to achieve market dominance by exploiting technology, civilian organizations seek the integration of information systems, so a RMA force also seeks to implement and integrate advanced military systems. The integration of improved ISR collection procedures, advanced C4I assets, and precision munitions are the primary contributors to the development of the system-of-system concept. Proper implementation of these components also creates the basis of assumptions that will drive the way military operations are conducted and what measures are used to assess their performance under this paradigm.

Preparing a RMA force based upon these assumptions has led to a process-improvement strategy of war, where warfighting practices are enhanced as a result of utilizing technological advances. In the IT Implementation Model, organizations seek to improve their internal processes by leveraging technology to obtain and share real-time market information so that better, more informed decisions can be made at all levels of the organization. The RMA concept also seeks to leverage technology to gain the same results: obtaining battlespace awareness and sharing battlespace knowledge in real time to enable rapid and precise engagement of the enemy. In the RMA model, the improved warfighting practices are represented by two types of factors; the three components of the system-of-systems approach that independently improve military operations, and the resulting factors from the integration of those concepts that significantly enhance the conduct of military operations.



Finally, the practices employed under this paradigm have a directed affect on warfighting performance. Endeavoring to accomplish the RMA concept of warfighting theoretically results in a high level of warfighting performance (organizational productivity) based upon measures of efficiency defined by the original assumptions of the conduct of war in this manner. Since directive organizations seek to achieve control through efficient operations, the success of the RMA concept should be assessed in relation to the processes emphasized by this organizational paradigm.

3. Network-Centric Operations

A key concept introduced in this research was the notion of conducting network-centric operations, particularly on the future battlefield. The previous chapter described the network-centric concept (as an optimal/generative approach to organizational management), defined Network-Centric Warfare as a warfighting concept, hypothesized

the possible implications of NCW, and discussed how the Marine Corps could move toward exploiting NCW in the future. These analyses are summarized below.

a. What is the Optimal/Generative Approach?

To gain a competitive edge, or sometimes even just to survive, in today's constantly changing, time-critical, complex economic market, managers, business executives, and consultants have continually sought to maximize organizational performance. Previously, two of the most sought after methods of organizational management today have been presented – employee empowerment and IT investing. This research has shown that organizations instituting empowerment strategies will experience high performance results in the form of more effective organizational productivity, and that organizations investing in IT and implementing integrated information systems appropriately will experience high performance as a result of increasing the efficiency of the organization's key processes. Though both models can result in high performance, neither results in optimal organizational performance. A newer, organization and management paradigm was presented that draws upon the strengths of the two previous models to achieve maximum organizational performance: The Generative Approach.

Business executives are now understanding that IT investment alone will not produce the types of results needed to be "high performance" in the future, nor will implementing more empowered teams make the organization more effective. They are realizing that it must be a mix of both IT and people power to produce truly high performance results. New IT systems should provide empowered employees (and teams) the detailed information they need to make the best business decisions; and engaged, empowered employees can help fulfill the potential promises of IT through innovative and creative implementation. Integrating the two creates a joint impact that is much greater than the sum of their individual parts. Research has proven that striking results emerge when organizations implement simple, well-known empowerment strategies (i.e., self-directed work teams) along with extensive IT use – results that surpass those organizations that implement only one of these organizational strategies (Brandt, 1998).

Thus, based upon theoretical models and research data, to achieve the maximum potential performance, organizations need to optimize means and ends, efficiency and effectiveness, IT implementation and employee empowerment. Applying

the Generative Approach to organizational management provides a model to accomplish that.

Meshing the principles of the Empowerment Model and IT Implementation Model presented before, a final model was introduced that depicts the principles necessary to achieve the optimum organizational performance of a Generative Organization (see Exhibit 6.5). Exhibit 6.5 below is a graphic representation that synthesizes the theoretical concepts of a Generative Organization; one that focuses on maximizing efficiency and effectiveness.

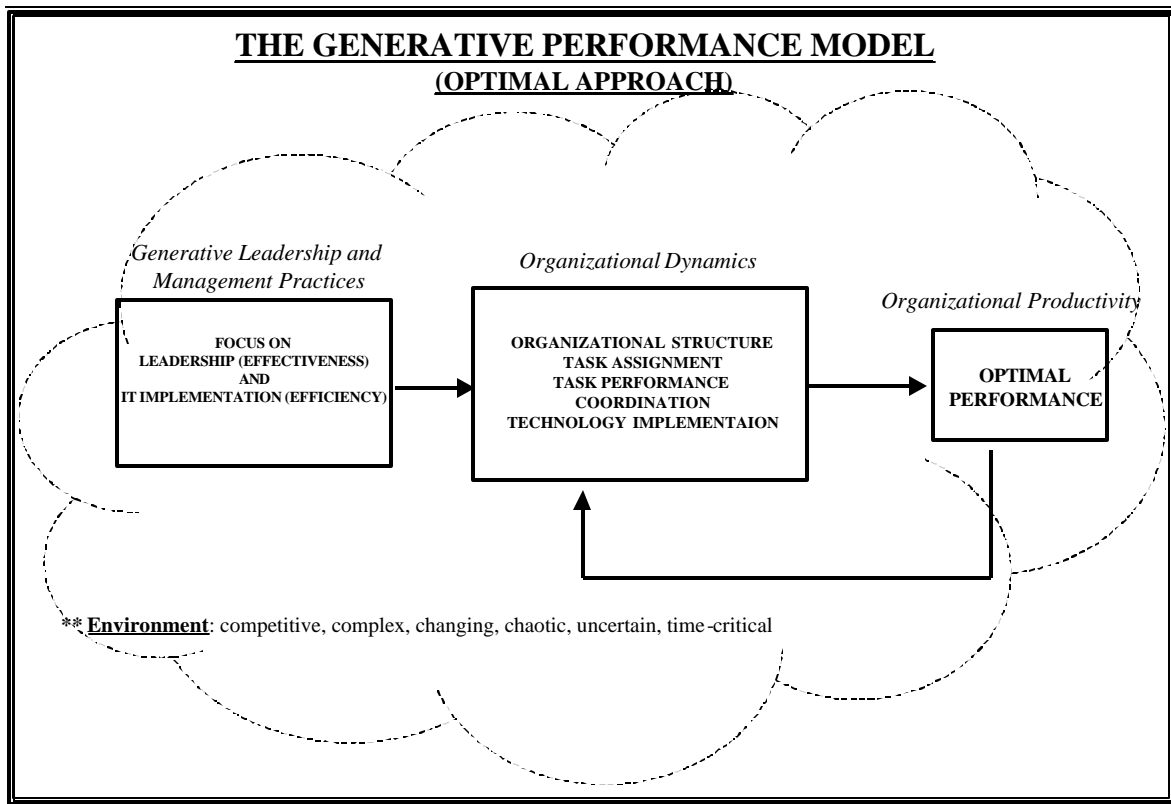


Exhibit 6.5

In this model, a concentration on both leadership (effective) and management (efficient) practices is necessary to influence the organizational behaviors that yield productivity. Specifically, an organization that seeks to remain competitive in today's, complex, chaotic, rapidly changing market, will need to invest in effective leadership and efficient IT implementation strategies (Brandt, 1998). Integrating these new strategies will obviously affect the dynamics of the organization. Generative practices will affect the way that the organization is structured, how tasks are assigned,

how tasks are performed, how internal and external entities coordinate with one another, and even how technology is exploited to improve each of these processes. Proper integration of the two will yield an organization with empowered employees, who utilize improved organizational procedures to produce optimum organizational performance. This increased level in organizational productivity generates a continuous cycle of organizational learning in the form of validated feelings of employee empowerment, and improved organizational processes.

b. What is the Network-Centric Concept?

The current information revolution is transforming the modern society into an Information Society; one in which information systems and concepts are shaping the way that people live. Information age technologies are enabling advances in speed and are resulting in broader access to information at increased speeds. Additionally, limits to the speed of operations are no longer constrained by time or space, because IT allows near real-time communication between organizations, regardless of their geographic location, through networking. Today, commercial organizations are leading the way in adopting Information Age concepts and technologies to create a market advantage in a highly competitive task environment. In an effort to remain competitive, these organizations have attempted a generative/optimal approach toward organization and management by relying on technological advances in networking to leverage the power of IT.

Today's high performance organizations have discovered that information and information technology are high value-creating variables for organizational productivity. In relation to evaluating integrated information systems, Metcalfe's Law explains the potential power and gained advantage of IT as an increase in overall productivity, due to the information-intensive interactions between multiple nodes within an organization (network). In using information technology to establish networks for the purpose of establishing/maintaining a competitive advantage, the object is to approach the upper bounds of network power before any competitor. The competitor that most successfully exploits the power of networking information among its organic entities in the same work domain as the competition is said to have gained relative information superiority over those competitors.

To develop competitive advantage enabled by a superior information position, commercial organizations are shifting from company-centric to network-centric enterprises. Network-centric enterprises are characterized by information-based strategies for creating and exploiting information technology. They begin with an extensive information infrastructure that enables the processes, which improve competitive awareness of market environment to be shared throughout the organization (via networking). This, in turn, enables processes that exploit the new found awareness to result in an improved "bottom line" or increased organizational performance. Thus, the power of the organization is in the network. The networked enterprise has the ability to share information across functional boundaries, which enables resource allocation decisions to be made from an enterprise-wide perspective instead of from a functional perspective.

c. What is Network-Centric Warfare (NCW)?

The principles employed by network-centric enterprises that allow them to leverage technology to achieve a competitive advantage, notionally can be translated into operational doctrine for future military forces. Thus, for the sake of this argument, the military is considered a network-centric enterprise that conducts warfare as its business. The conduct of war under this paradigm is Network-Centric Warfare (NCW). The term NCW is used to describe the concept of how military forces will be trained and organized to fight in the future. For this thesis, the functional definition of NCW used was:

...An information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision-makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. (Alberts et al., 1999, p. 2)

In general, employing NCW concepts enables a military force to translate information superiority into combat power by establishing a robust network that links all knowledgeable entities in the battlespace.

NCW is a new warfighting paradigm that seeks to exploit the advantages of information technologies to develop information superiority, leading to battlefield awareness and later escalating to battlefield dominance. It is a conceptual framework for warfighting from which future military operations can be planned, providing a fresh

perspective to ensure new approaches and solutions are explored. NCW is not strictly a technology-based concept of operations, though; it is an evolving military response to how to effectively manage human and organizational behavior in the Information Age – it is not just about technology, as much as it is about how technology is used. Thus, NCW is not concentrated on IT or network capability, but on what those capabilities do – enabling the rapid, real time exchange of information so that empowered decision-makers can make better, more informed decisions during the complex act of warfighting.

d. What are the Implications of NCW?

Another approach to examining this research question includes determining what the results, consequences, and outcomes for military practitioners would be if the theoretical concepts of NCW were actualized on the future battlefield. Several high-performance civilian organizations have achieved good success by exploiting IT to gain a competitive advantage within their task domain. Additionally, this thesis provided data to substantiate the fact that the organizations that attempted to implement the two paradigms of empowerment and IT implementation achieved a higher level of performance than did their one-dimensional counterparts. Furthermore, the generative organizational concepts previously presented, which demonstrate the "new management paradigm" (the Optimal/Generative Approach), emphasize both efficient and effective operations to obtain optimal performance, and seek to establish empowering, information-based strategies to achieve levels of performance not previously possible. Therefore, although the NCW concept is based upon theoretical assumptions that have not yet been proven in battle, this study explored the hypothetical implications of applying the notional paradigms above (network-centered operations) to a military organization.

The potential advantages of implementing NCW are great and are measurable in both areas of efficiency (performance of tasks quickly, inexpensively, and easily) and effectiveness (production or achievement of desired outcomes). The full integration of battlefield systems through a common information network results in at least three significant advantages: the networking of long range sensors and weapons (actors) for the simultaneous massing of fires on enemy targets; geographic dispersal allowed by long-range, wireless communication network resulting in greater force protection; and tremendous increases in operational tempo, including the decision making

process (FitzSimmonds, 1998). The desired effects achieved by this concept include increases in responsiveness and tempo of operations, lower risks and costs, and increased combat effectiveness (Alberts et al., 1999). NCW enables the overall optimal performance of desired results; maximized potential efficiency to achieve maximized potential effectiveness.

e. What is the Applicability of NCW to Marine Corps Warfighting?

The theoretical framework presented in Exhibit 6.5 was established based upon a substantial review of principles, theories, and prior research of organizations that function under competitive, complex, and rapidly changing market conditions; and must make time-critical decisions in an uncertain environment. Likewise, this describes the environmental context in which military organizations must function while engaged in warfighting. Therefore, I theorized that the principles of the Generative Performance Model could also be used in evaluating military warfighting.

An evaluation of the components of the Network-Centric Warfare concept reveals attributes that are similar to other generative organizations. Organizations that "fit" into the Generative organizational configuration, like military forces operating under the NCW warfighting paradigm, seek the same objective: optimal organizational performance through an emphasis on efficient and effective operations. The central thought of NCW is not about turning over the battle to the network, but "it is really about exploiting information to maximize combat power by bringing more of our available information and warfighting assets to bear both effectively and efficiently" (Alberts et al., 1999, p. 12). NCW is not just about the network, but it is mainly about the overwhelming advantage that the power of the network gives to a commander as he decides how to empower his subordinates to reach their maximum potential; a combination of efficient management processes and effective leadership practices.

What should result is a networked military force of battlespace entities that exchange real time information to create a competitive advantage through information superiority that allows each knowledgeable entity to operate autonomously on the battlefield, armed with dominant battlespace awareness and the commander's intent, to make faster, better, more informed decisions – a generative approach to warfighting. Thus, consistent with the operational focus of the generative concept NCW

seeks to achieve optimal performance by conducting efficient means to achieve effective ends.

In Exhibit 6.6 below, the NCW concept is characterized as a generative, network-centered approach to warfighting. NCW, like other generative organizations, seeks to achieve optimal organizational productivity in measures of both effectiveness and efficiency. Therefore, the corresponding practices should reflect those present in the Generative Performance Model.

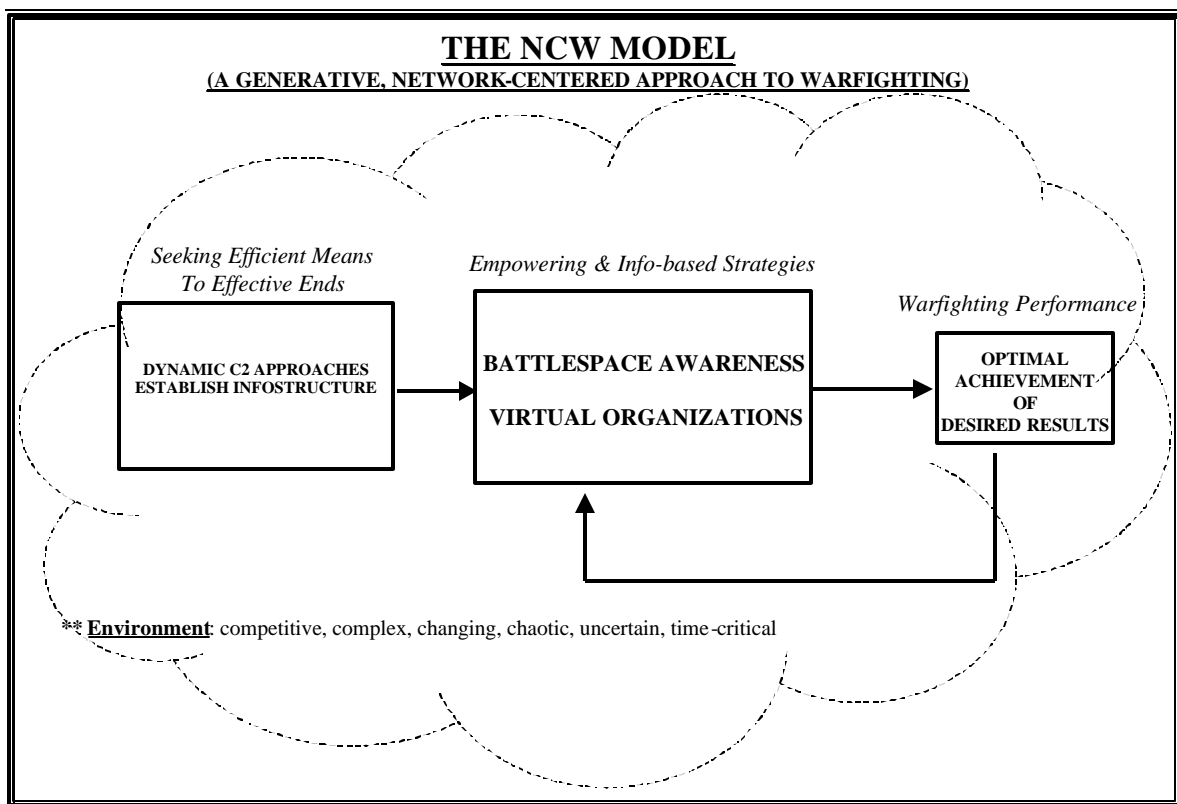


Exhibit 6.6

The NCW concept seeks to focus on developing efficient means (IT implementation) to achieve effective ends (Focus on Leadership). The initial thoughts, assumptions, and beliefs about operating under this paradigm (the input) center on establishing a robust, extensive data communication infostructue and developing dynamic approaches to command and control issues. Utilizing the infostructure augmented by the real-time information sharing of knowledgeable battlespace entities would create dominant battlespace awareness as a result of the efficient exchange of knowledge.

Altering the C2 structure (flattening the hierarchy), decentralizing command authority, and implementing a coherent, common picture of the battlespace are but a few examples of initiatives in granting decentralized empowerment to competent battlefield leaders. When implementing the NCW concept, empowering and information-based strategies are implemented to improve the organizational dynamics: achieving battlespace awareness and implementing virtual organizations. Battlespace awareness is the result of linking all battlespace entities to achieve a level of dominant awareness by creating a common picture of battlespace activities. Virtual organizations bring the necessary people and processes together to accomplish a particular mission. Enabled by networking, it is merely a term to describe the combined effects of virtual collaboration (real time coordination between geographically dispersed forces) and virtual integration (real time operations with geographically dispersed forces), which leads to the self-synchronization of forces.

Finally, proper implementation of the empowering and information-based strategies that affect the organizational dynamics are predicted to yield an improved level of warfighting performance. Since generative models start out with basic assumptions about the importance of efficient and effective operations, the practices that are conducted and the measures used to evaluate overall performance will concentrate on both areas, unlike the previous two warfighting paradigms.

One of the major findings that I presented in this thesis is that the NCW model presented above can serve as a framework that can be used to measure a military organization's progress towards achieving optimal results by assessing how well the organization is implementing the process dynamics (i.e., Battlespace Awareness and Virtual Organization). Here, the term "optimal" does not suggest "perfect" performance, but instead it means achieving the highest possible results given the resources. Theoretically, a NCW force that correctly and successfully implements empowering, information-based strategies will achieve optimal desired results.

B. RECOMMENDATIONS

Throughout this thesis, the argument has been presented that future warfare will reflect the warfighting concepts of (RMA and NCW). Of the future warfighting concepts currently recognized, I hypothesized that NCW is a style of warfare that will give a modern military force improved performance on the battlefield through integrating

information technology-based systems along with the empowering concept of decentralized command and control. From the initial hypothesis, I set out to define the integration of this new paradigm and actual warfighting performance. The final, yet integral, research question of this thesis centers on this relationship, and more specifically on how network-based military operations can be measured and evaluated in terms of the contribution to warfighting performance.

The fact is, given the Marine Corps' current experimental exercise implementation and evaluation practice, it is not feasible to evaluate the effects of NCW concepts on warfighters, nor is it possible to adequately evaluate how empowered warfighters perform in a NCW environment. This is the case because current equipment testing and warfighting experimentation is not focusing on the measures necessary to evaluate the relationship between warfighter empowerment and the network-centric concepts. The research conducted for this thesis sheds some insights on this observation. Each of the models that have been presented in this thesis reflect the original basic systems model (see Chapter 1, Methodology). In that model, I generalized that organizations start with goals and assumptions about how operations should be conducted based upon findings from theoretical research or observations. These assumptions guide the practices that organizations perform in an effort to exploit the potential power of people and/or technology with the goal of achieving a high level of performance. The practices and procedures that are conducted yield some level of organizational productivity. The measures used to assess productivity are typically reflective of the projected goals, derived from the original assumptions and theories of operation. Therefore, if the goal is to implement network-centric operations, it is necessary that appropriate measurement tools be developed in order to accurately assess organizational productivity.

Currently, the U.S. Marine Corps is experimenting with networked-based operations, but has not developed the proper tools necessary to adequately measure the productivity of a generative organization. While conducting the research for this thesis, I spent three weeks at the Marine Corps Warfighting Laboratory, where tactics, techniques, and procedures are developed for the future Marine warfighters. After conducting several interviews and observing the planning and execution of an experimental exercise, I gathered that the tools (after action reports, questionnaires, follow-on research, etc.) used to evaluate the experimental exercises during which network-based strategies were employed, were nearly the same tools used to evaluate operations conducted within the

other operational paradigms. By using pre-existing tools to measure new concepts, inadequate and inaccurate results will be obtained.

I provide, as an example, a situation where a Marine Corps unit is experimenting with an apparatus that allows tactical warfighters to see a digitized depictions of all entities on the battlefield at real time; a capability once possible only at higher echelons of command. During the exercise, if analysts are capturing data that measures how quickly information is flowing between nodes (warfighters), how many battlefield entities can be placed and recognized on the digital map, and other questions that deal with network functionality, these data will not sufficiently measure the productivity of a Generative (NCW) organization. Additionally, upon completion of the experiment, if warfighters are asked how the weight of the apparatus affected their ability to move, the longevity of the unit's batteries, or any other question regarding system functionality, these data, too, cannot adequately evaluate the performance of a unit employing network-based concepts. In this case, the measures are focused on technological performance, without much emphasis on the human behavioral aspect of warfighting. Thus, the data would be satisfactory to measure the performance of a Directive organization and its efficiency-oriented capabilities, but not would not be appropriate for a Generative organization. While this focus may be because measurement of these features is easier to accomplish, it is also possible that this emphasis reflects an underlying assumption that the dominant advantage of NCW is in technology.

Additionally, it must be noted that the changing nature of war resulting in a changing battlespace will also change the types of measures and indicators of success necessary to evaluate warfighting performance. For example, measuring the amount of enemy casualties and collateral damage inflicted are not good indicators of success for a humanitarian assistance operation. The changing battlespace (task environment) will require new measures of success that determine how well the force is performing (Alberts, 1996; Alberts et al., 1999). Therefore, leaders must focus on the effective results achieved by military operations, as well as the efficient conduct of those operations. In order to correctly measure the effectiveness of an organization that employs a network-based form of warfare (NCW), tools must be developed that capture the characteristics of a Generative organization. As a model for this assessment approach, the NCW Model presented in Chapter 5 of this thesis is provided.

In order for this assessment approach to be effective, analysts must gather measurements at the input, process, and output levels. At the input level, analysts must

seek to capture the primary assumption of network-based operations; that the organization seeks to develop efficient means through IT implementation, and to achieve effective ends, through focused leadership. Input variables include efforts to establish a robust, extensive data communication infostructure and develop dynamic approaches to command and control issues. An approach to capture its success would be to evaluate the ability to share real-time information to all entities on the battlefield, which would increase the battlespace awareness for all warfighters. Input parameters that could also be evaluated are the effects of an organizations decision making capability given an altered C2 structure (i.e., flattened hierarchy), as well as the ability to implement a coherent, common picture of the battlefield so that decentralized leaders could function successfully without an extensive C2 structure and the quality of those decisions made given that common picture.

Evaluating the processes that a network-based organization utilizes may be more challenging. However, the focus of this type of evaluation should be on measuring how empowering and information-based strategies are implemented together to improve organizational operations. Measuring battlespace awareness and the ability to establish, maintain, and execute virtual collaboration would include evaluating how units work with one another on the battlefield to coordinate fires, maneuver, and execute critical tasks. Again, the idea is that a shared, common picture, maintained in real-time, should improve the processes (tactics, techniques, and procedures) of warfighting units. Measuring only the technical capability of systems designed to enhance awareness provides an incomplete assessment.

Finally, an assessment approach that adequately captures the performance of a unit operating under the NCW concept must also possess the ability to measure overall performance both in terms of efficiency and effectiveness. If the optimal achievement of desired results is the original expectation for the NCW model, then, upon conclusion of the exercise, the performance of warfighting units must be evaluated next to what the assumed highest possible results were, given the available resources. For example, this might include one unit assuming another unit's mission to meet a critical objective in a given amount of time, after an unforeseen change in the mission plan that would not have been possible to alter using a typical C2 structure. Battlespace awareness and virtual collaboration could optimally lead to warfighters orienting to new threats and responding to them in a timely manner, before higher-echelons of command would even be made aware of the threat.

The Network Centric Warfare concept promises warfighting performance that has never been experienced so far. However, to facilitate the implementation this future warfighting concept, experimental exercises must be conducted to develop proper tactics, techniques, and procedures that exploit the advantages made feasible by modern technology to fight tomorrow's battles. In order to achieve the optimal results that are desired, though, an approach to measurement must be developed that adequately evaluates the ability of an organization to emphasize efficient, technological practices, with effective, empowering strategies. If this is achieved, then this mix of technology and decentralized leadership will birth a form of warfighting performance whose end result is rapid battlefield dominance that will be unrivaled by any form of current warfare.

APPENDIX A: MARINE CORPS WARFIGHTING DOCTRINE

The Marine Corps publication, *Warfighting*, describes the Marine Corps' basic philosophy on warfighting as it relates to the nature, theory, and preparation for warfare. Within this appendix is a brief description of these fundamentals. This appendix is provided in case the reader is not familiar with military terminology and concepts. The fundamental principles of Marine Corps warfighting are more explicitly explained in this appendix.

A. NATURE OF WAR

Before examining standards of conduct that govern warfare, it is necessary to discuss the environmental context in which military organizations operate. In the first Chapter of this thesis, I theorized that the military functions in a complex, chaotic, uncertain task environment analogous to civilian organizations in the commercial sector. However, I did not provided substantial evidence to prove this point, outside of basic reasoning. Therefore, in this section, I intend to describe the task environment of warfare, validating the necessity for effective leadership and resourceful management practices similar to those employed by the commercial organizations identified follow-on chapters.

The FMFM1 *Warfighting* (1989) doctrinal publication explains the current Marine Corps philosophy of warfighting as it relates to the nature, theory, preparation, and conduct of war. It provides the authoritative basis for how the Marine Corps fights and prepares to fight. *Warfighting* does not seek to provide specific techniques or procedures to manage the performance of war, but to provide guidance concerning the general concepts and values that shape that performance. The FMFM1 provides a basic understanding of the Marine Corps' fundamental assumptions, beliefs, and ideas about war.

Warfighting (1989) expresses that war is "a state of hostilities that exists between or among nations, characterized by the use of military force. The essence of war is a violent clash between two hostile, independent, and irreconcilable wills, each trying to impose itself on the other" (p. 3). Thus, war is characterized as a competitive, hostile relationship between two independently thinking and opposing parties who are constantly attempting to impose their wills on each other. The hostile act of war, perpetuated by

human behavior, generates and takes place in an environment marred with complexities (friction, uncertainty, fluidity, and disorder) that must be observed and managed from a calculating and creative perspective. Following is a description of how each one of these factors affect the nature of war.

1. Environmental Complexities

The environmental complexities of war are those factors that are both internally and externally generated by the violent clash of two independent wills. They are inherent in every instance of warfare and cannot be avoided, although successful military forces will learn how to operate successfully within the complex environment.

a. Friction

The conduct of war is a very difficult process, because there are several factors that affect it. Collectively, all of the factors that affect warfare are called friction or, as Clausewitz the well-respected German military tactician described it, "the force that makes the apparently easy so difficult" (*Warfighting*, 1989, p. 4). Friction manifests itself physically and mentally. The physical clash between the two opposing wills literally causes friction, or difficulties in resolving issues, between the two parties. Additionally, mental friction in the form of indecision is caused when external and internal forces are pressuring the situation. External mental friction arises when problems with the enemy, terrain, or weather surface, whereas internal mental friction occurs in instances when there is a lack of a clearly defined goal, poor coordination is conducted, plans are complicated, or even when communication systems are unreliable.

The objective of responding to friction is not to attempt to minimize the friction, but to operate effectively within it. A force can only overcome the negative effects of friction with the knowledge and experience from those throughout the organization (*Warfighting*, 1989). Related to the context of this research, friction refers to the complex, competitive environment in which the identified organizational configurations must function.

b. Fog of War

The fog of war refers to uncertainty present during the planning and execution of military operations. All actions that take place on the battlefield happen

under uncertainty. There will always be unknowns about both the friendly and enemy situation on the battlefield. The goal then, is to reduce the fog of war by establishing simple, standard procedures that reduce the uncertainty of the friendly situation, while remaining flexible enough to adjust to any new situation or enemy response that might arise. The Marine doctrine is to "learn to fight in an environment of uncertainty, which [they] can do by developing simple, flexible plans; planning for contingencies; developing standard operating procedures; and fostering initiative among subordinates" (*Warfighting*, 1989, p. 6). Although absolute certainty is not possible, military forces can seek to reduce the unknowns by gathering and sharing information between all units in the organization. In this context, the fog of war refers to the "uncertainty" faced by other organizations presented in this thesis.

c. Fluidity

War is framed by several episodes comprised of unique combinations of circumstances that combine to form a constantly changing series of events wrought with unforeseen opportunities and dilemmas. The activities encountered during the conduct of war are unpredictable and, therefore, present warfighters with a constantly changing mosaic of events, opportunities, engagements with which to contend. Contending with these changing events will also vary the speed of command and corresponding operational tempo (*Warfighting*, 1989). Since fluidity is change, success in battle depends greatly upon the ability of a military force to adapt to constantly changing situations; that is to function effectively within a fluid environment.

d. Disorder

When the environmental complexities of friction, uncertainty, and change are present during warfighting, the natural result is disorder -- chaos. Complete order is not likely to be obtained in such a complex practice as warfighting; thus, disorder will never be eliminated. Disorder will remain an invariable characteristic of warfighting because it is natural to assume that something will always go wrong in the planning and conduct of war. Instructions will be misinterpreted or unclear, communications will fail, mistakes will be made, and unforeseen circumstances will emerge.

Disorder will continue to be prevalent in warfare, especially on today's complex battlefield, which is fought in a three-dimensional battlespace (i.e., surface, sub-

surface, and air) unlike the linear environment of the past (frontal surface engagements). The increasing range and lethality of modern weapons has led to a wider dispersal of troops and forces, oftentimes beyond the positive control of current communication systems. This situation alone is enough to add significant concern to the confusion present in war, however, the gaps and exposed flanks created by the increased amount of dispersion present military forces with the potential of being exploited by an enemy.

Experienced practitioners of war realize that the conduct of war will not be orderly, so they do not seek to impose precise, positive control of all activities and events. Yet, they recognize that their forces must be able to operate in a disorderly environment and seek to generate a greater amount of disorder for the enemy in order to win in combat. The concept of disorder on the battlefield is the military equivalent of a chaotic task environment in the commercial sector.

2. Human Behavioral Aspects

Noting, again, that war is defined as a violent clash between opposing human wills, it is imperative to identify the human dimension as central to warfare. Acknowledging and appreciating the human behavioral aspects of warfighting is critical to understanding the nature of war. In *Warfighting* (1989), the human dimension of war is described clearly as an essential element to consider:

"War is shaped by human nature and is subject to the complexities, inconsistencies, and peculiarities which characterize human behavior...Any view of the nature of war would hardly be accurate or complete without consideration of the effects of danger, fear, exhaustion, and privation on the men who must do the fighting...No degree of technological development or scientific calculation will overcome the human dimension in war" (pp. 10-11).

Marine Corps warfighters recognize the importance of people, their emotions, thoughts, and actions when planning for the conduct of war, and realize that it is such a strong dynamic that it cannot be overcome or replaced by any other entity. Marines recognize that the conduct of war will require more than elaborate management practices to cope with the complexities of war (i.e., "technological developments and scientific calculations" that attempt to **replace** the human dimension), but that it will also require

effective leadership techniques that will address emotional turmoil faced by men in combat.

3. The Art and Science of Warfare

After presenting the environmental complexities and human behavioral aspects associated with the conduct of war, it is apparent that warfighting demonstrates qualities of both a science and an art. The scientific aspects of war include the specific tactics, techniques, and procedures that constitute executing warfare. Success in combat depends upon the ability to manage the technical aspects of these practices to reduce, or at least operate more efficiently within, the complex task environment. On the other hand, the conduct of war is also perceived as an art that deals with the inconsistencies of human behavior, and other intangible factors that affect it. Moral judgment, emotional anxiety, the psychological effect of chance events and more are all factors must be properly addressed to achieve the maximum effective performance of personnel.

Ultimately, the hostile, complex act of war requires a masterful control of both its technical and behavioral aspects. The same holds true for commercial, civilian organizations, which also function in complex market environments. According to research presented earlier in this thesis, successful managers and executives have discovered the art of effective leadership and the science of masterful management to create high-performing organizations. The question is whether the same principles proven in commercial industry can be applied to the conduct of war (*Warfighting*, 1989).

In summarizing the Marine Corps' philosophy about the nature of war, it is portrayed as a mixture of attributes that generate a complex, competitive, uncertain, rapidly changing, chaotic task environment, in which, humans are required to exert moral, psychological, and physical stamina to survive and win. The successful conduct of war requires a masterful balance of resourceful management practices that address the scientific aspects of operational efficiency, and effective leadership strategies that recognize the strength of the mental, physical, and emotional well being of those humans involved.

B. THEORY OF WAR

Having discussed the Marine Corps' perception of the nature of war, I will now describe the Marine Corps theory of war -- the assumptions, beliefs, ideas, and concepts

that form the foundation of the way the Marine Corps trains and prepares to conduct war. Through the observations of previous military conflicts, the authors of *Warfighting* (1989) have identified and developed certain beliefs about how warfare is conducted. These beliefs address the magnitude, levels, and styles of warfare as principles that govern planning for the conduct of war.

1. Spectrum of Conflict

The full spectrum of military conflicts range from light, low-intensity engagements (littoral skirmishes) to full blown, high-intensity warfare (nuclear war). The range or magnitude of these engagements is dependent upon several factors, to include national policy objectives, national opinion and will, military means available, enemy combat power, and other political or military dynamics. Charged as the nation's "force in readiness," the Marine Corps must be flexible enough to adapt to any level of combat intensity throughout the spectrum of conflict (*Warfighting*, 1989). What is important to note here is that the characteristics of war described in the previous section apply the full range of military conflict, though each component may be present at varying degrees.

2. Levels of Warfare

Just as war is conducted at varying magnitudes along the spectrum of conflict, it is also performed at different levels simultaneously. Warfare is conducted at the strategic, operational, and tactical levels, with each level focusing on "differing ends, means, characteristics, and requirements" (*Warfighting*, 1989, p. 22).

At the strategic level of war, the focus is on meeting national policy objectives set by the civilian leadership. Once objectives have been set, the most senior military decision-makers establish goals for broad theaters of war, then assign forces, provide assets, and impose conditions to achieve those goals. Strategic-level leaders focus on the "big picture" operations of war.

The tactical level of war includes a focus on "the application of combat power to defeat an enemy in combat at a particular time and place" (*Warfighting*, 1989, p. 23). This level includes the technical aspects of warfighting (tactics, techniques and procedures) necessary to accomplish specified tasks. Actions within the tactical level of

war constitute the means and ends of winning engagements and battles during the conduct of war.

Between the strategic and tactical levels is the operational level of war. Linking the two extremes, the operational level includes "the use of tactical results to attain strategic objectives" (*Warfighting*, 1989, p. 23). It requires operational decision-makers to decide when, where, and under what conditions to engage the enemy.

Since units within a military force operate at different levels of war, based upon their scope of responsibilities, the decision-makers within each unit require a certain level of information to make well-informed decisions within their scope (*Warfighting*, 1989). For example, if strategic level decision-makers are concentrating on information received from or intended for tactical level users, then they are probably not concentrating on the important decisions that need to be made concerning the "big picture."

For the purposes of this research, the term "warfighter decision-making" refers to the decisions and actions that are conducted at the operational and tactical levels of war, unless otherwise stated. A central issue that this research explores is the possibility that information technology allows tactical level actors (warfighters) to receive information, once limited to operational level planners, and the strategic implications of empowering subordinates with the decision authority to affect the conduct of war. A related question emerges; what means would be necessary to ensure that the tactical decision-makers can make competent, meaningful, impacting decisions that are doctrinally reserved for upper-level decision makers?

3. Styles of Warfare

When discussing styles of warfare, one must first understand that there are two essential components of combat operations that are mutually dependent and complimentary: fire and maneuver. The effective maneuver of military forces allows fires to bear on the enemy, and the protection provided by fires allows movement in the face of the enemy; one cannot exist without the other. These two components provide the foundation for two distinctly different styles of warfare based upon the concentration of either fires or movement. These two styles are Attrition Warfare and Maneuver Warfare (*Warfighting*, 1989).

a. *Attrition Warfare*

In Attrition Warfare, military forces seek victory through massing of superior firepower and technological advantage to destroy enemy material assets. An attrition-based warfare doctrine perceives the enemy as merely targets to be destroyed, in a methodical, systematic manner; much like a scientific approach to warfare. It seeks to engage in battle under any circumstances, pitting strengths against strengths. Conducting war in this manner requires that the enacting force also withstand attrition of its own forces, which is the costly expense of human life (*Warfighting*, 1989). Because of a focus on the efficient conduct of military operations, attritionists gauge progress using quantitative measures of merit (i.e., focusing on physical damage inflicted on the enemy). Hence, the basic assumptions of warfare have resulted in the type of measures that are used to evaluate its progress.

In relation to the organizational configurations identified in Chapter 4, organizations that ascribe to the attrition-warfare based doctrine are most compatible with the Directive paradigm. Bearing in mind that Directive organizations seek efficient operational performance by inducing strong controls on the internal practices of the organization, it is evident that attrition warfare seeks similar ends. *Warfighting* (1989) even characterizes the attrition-style of warfare in this manner:

The desire for volume and accuracy of fire tends to lead toward centralized control, just as the emphasis on efficiency tends to lead to an inward focus on procedures and techniques. (p. 28)

b. *Maneuver Warfare*

The Maneuver Warfare style of warfighting seeks to avoid problematic situations and enemy strong points, and to apply strength to exploit enemy weaknesses and vulnerabilities. These weaknesses are exploited to achieve success in battle when the military force displays speed, surprise, concentration of effects, and boldness. Speed (tempo) is probably the most important of these attributes and is used as a weapon when this style of warfare is used. Functioning effectively at a high operational tempo requires decentralized control of forces. Additionally, practitioners of Maneuver Warfare realize that numbers (mass) cannot replace skill (human behavioral aspects). Therefore, a greater demand is placed on the personal judgment of battlefield leaders. Contrary to the Attrition Warfare objective of massing fires to destroying the enemy, the objective of

Maneuver Warfare "is not so much to destroy physically as it is to shatter the enemy's cohesion, organization, command, and psychological balance" (*Warfighting*, 1989, p. 29). It focuses on the achievement of effective ends vice measures of performance rated in relation to efficient operations.

C. PREPARATION FOR WAR

By now, an adequate understanding of factors that affect the complex environment in which military engagements take place (nature of war), and the underlying assumptions of warfare that form the foundation of Marine Corps doctrine (theory of war) have been developed. At this point, the elements of warfighting preparation can be revealed. The essential elements that must be set in place before warfare can be conducted successfully include: organizational structure, effective leadership, technologies, and equipment.

1. Structure

Because the spectrum of war is so vast, Marine Corps forces should be organized in a flexible manner to meet multiple requirements around the world; they must be ready in peacetime and wartime. In order to meet the multiple global challenges, these forces should be deployable and maintain the ability to task-organize to meet the specific requirements of specific situations. Finally, the headquarters organizations and staffs should be streamlined to eliminate bureaucratic delays in order to increase the tempo of decision-making and speed of command (*Warfighting*, 1989).

2. Leadership

Leadership is the mainstay of the Marine Corps. The Marines thrive on creating effective leaders, who are proficient in their skill and dynamic leaders of people. Below several factors of leadership are described that are necessary to prepare adequately for combat.

a. Competence

Marine Corps doctrine requires that its leaders be professionally competent as experts in the conduct of war. This includes the intellectual and practical

aspects of job performance (*Warfighting*, 1989). Just as any corporation would require that its managers and executives to be competent in conducting good business, including effective leadership and management practices, the Marine Corps requires the same from its leaders. The more senior that a Marine becomes, the more that he or she is expected to display mastery of the art and science of war at all levels. Leaders that have confidence in their ability and skill experience feelings of competence when empowered to demonstrate their skill in challenging situations.

b. Initiative and Boldness

Marine Corps doctrine requires intelligent leaders with a propensity to act with boldness and initiative at the lowest levels. Marines are encouraged to develop and display both traits, without fear of making mistakes (*Warfighting*, 1989). As a matter of fact, the errors of timidity and indecision are more damning than errors encountered while exercising bold initiative. These traits imply that the authority to act and make decisions that may affect the entire organization is granted to the lowest-level leaders within a military force. The Marine Corps understands that empowering their subordinates with decision-authority elicits feelings of choice within these low-level leaders and draws upon their knowledge expertise to induce performance that is more effective.

c. Trust

Trust is the key factor in preparing a formidable force for combat; trust by seniors in the abilities of their subordinates and trust by juniors in the competence and support of their seniors. Although, a force must begin preparing for war under a certain level of trust, trust is intensified when professional skill by either seniors or juniors has been displayed (*Warfighting*, 1989). For military leaders who decide to employ empowering strategies, trust in subordinates enables feelings of choice and allows them to demonstrate their true level of competence.

d. Candor

Professional candor permits 360-degree feedback, where seniors listen to what subordinates think about the situations and decisions that transpire. Again, subordinates are empowered when seniors get them to participate; and seniors can evoke

participation by asking for their subordinates' professional opinions. The only way that senior-level leaders really know what is going on in the heat of battle is if they solicit input from those at the lower levels (*Warfighting*, 1989). This also displays trust and confidence in the junior's level of competency.

3. Training & Resources

In order to develop competent decision-makers at all levels that confidently act with bold initiative, and gain the trust of their seniors, a military force must ensure that its personnel are properly trained and have access to all available resources that will allow them to operate effectively under fire. It is imperative that material and educational resources are made available, and that time is allotted to conduct the training necessary to achieve an acceptable level of proficiency. For the military leader/decision-maker, proficiency is the tactical and technical knowledge, skill, and expertise required to perform well in combat.

a. Tactical Proficiency

Tactical proficiency includes a thorough knowledge and understanding of the conduct of war; an awareness of the doctrine and concepts that frame warfare for both friendly and enemy forces. Warfighters develop knowledge by learning about the fundamentals of warfare in a sterile instructional environment; understanding is obtained when the instructional knowledge is put to practice during training events; however, tactical proficiency is only achieved through continuous study and repetition of practical training evolutions. Training should reflect realistic, challenging, and progressive goals that develop creative thinking leaders. Nevertheless, military forces should be given adequate resources to ensure effective training is occurring that will keep the forces combat ready.

b. Technical Proficiency

Technical proficiency is developing knowledge of the equipment capabilities and understanding of the technological concepts that influence the conduct of war. Especially, when subordinates are given the authority to make decisions that may possibly affect the entire unit, it is important that these subordinate leaders understand the capabilities of the equipment and technologies available to them in order to maximize

their effects. Marine Corps doctrine establishes firm standards for the role of equipment and technology in the conduct of war.

First, Marines believe that equipment should be easy to operate, simple to maintain, reliable, and interoperable. Because they acknowledge human behavioral aspects as important factors of warfare, Marines recognize that equipment should enhance military operations, not add more complexities that detract or deter people from seeking the equipment's correct, effective employment. Furthermore, Marine Corps doctrine asserts that equipment, including weapons, tools, and systems used in warfighting, should be designed so that their usage is consistent with pre-established doctrine and tactics (*Warfighting*, 1989).

On the other hand, if advances in technology bring about changes in equipment, then employment techniques and procedures should be developed concurrently with the technological concepts that drive operation of the new equipment. Particular attention must be made, though, to develop techniques and procedures that do not violate the fundamental principles of war held by Marines. In *Warfighting* (1989), it is expressed that "equipment that permits over control of units in battle is in conflict with the Marine Corps' philosophy of command and is not justifiable" (p. 52). Thus, the Marine Corps doctrine places a heavier emphasis on the achievement of effective ends vice the development of efficient means; they will compromise potential increases in efficiency for the preservation of effectiveness.

Finally, Marine Corps doctrine is explicit about the subordinated role of technology in regards to warfighting and seeks to implore leaders to guard against over reliance on it. *Warfighting* (1989) explains the Corps' position clearly on this issue:

Technology can enhance the ways and means of war by improving ability to wage it, but technology cannot and should not attempt to eliminate man from the process of waging war. Better equipment is not the cure for all ills... (p. 52)

Instead of an over-concentrated effort in developing technologies that improve warfighting performance, Marine Corps doctrine suggests that doctrinal and tactical solutions should be sought. Therefore, the necessity for warfighting leaders to maintain tactical and technical proficiency is evident here. Especially on today's modern battlefield, decision-makers must be careful not to become so dependent upon technology that their units cannot perform effectively if the equipment becomes inoperable or the

technology is not available, remembering that the human dimension is the one true dynamic that will always exist in warfighting (*Warfighting*, 1989).

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APPENDIX B: FACTORS FOR FUTURE WARFIGHTING

The factors constituting the nature, theory, and preparation of warfare that were described in Appendix A are issues that have been time-proven in past and current combat situations. However, we have entered a new era in time. This new era, deemed the Information Age, has already produced technologies that have affected considerable changes in our culture -- the way that we think, live, and act. One can only imagine what additional technological advances will emerge during this period of history. As the world changes, it is inevitable that the conduct of war will surely change also (Cebrowski & Garstka, 1998).

The nature of war for future military operations encapsulates two new concepts of warfighting: the Revolution in Military Affairs (RMA) System-of-Systems concept and the Network-Centric Warfare concept. Different standards that govern the conduct of war apply to both of these warfighting paradigms. The concepts of warfare described in previous sections of this thesis are not to be ignored, but are merely augmented by new complexities, assumptions, and factors brought about by advances in the technological society. Therefore, this appendix will address specific issues related to the nature, theory, and preparation required for warfighting in the future. Three classes of activities that will be affected by changes from the new era include: the nature of future "traditional" combat; the evolution of non-traditional missions and expectations; and Information Age Warfare (Alberts, 1996).

1. Future "Traditional" Combat

In future military operations, "traditional" combat -- current practices of conventional warfare -- will be characterized by significant changes in the battlefield, tempo, concept of operations, as well as command and control practices required in warfighting. Today's contiguous battlefield will become a disjoint, disorderly, three-dimensional "battlespace" occupied by widely dispersed forces with no defined rears, fronts, or flanks (Alberts, 1996). The enemy, which will be present from all angles, must be engaged with deadly precision in order to preserve the life of the force (FitzSimmonds, 1998). The tempo of future operations will be extremely high compared to today's standards, requiring an efficient means of increasing the decision cycle. Additionally, the concept of operations is expected to change in future warfighting,

shifting concentration from a massing of forces to a massing of precision fires (Alberts, 1996).

Finally, future traditional combat will require significant alterations to the current command and control philosophy of American forces. Due to advances in communications and surveillance equipment, commanders will have the potential to have a more direct influence on shaping the battlespace as a result of increased battlespace knowledge. Changes to the current command structure will also be required. Support staffs will be streamlined in an effort to flatten organizational structure, which will be necessary to facilitate rapid information flow to the warfighter; virtually all information will be distributed horizontally to all battlespace entities. Furthermore, automated decision aids will be incorporated in the decision-making processes that are essential to warfighting (Alberts, 1996). In all, the face of "traditional" combat will be altered quite dramatically if these predictions are true.

2. Evolution of Non-Traditional Missions and Expectations

In future military operations, "non-traditional" missions (e.g., humanitarian assistance, disaster relief, crises intervention, support for peace operations, drug interdiction, countering the proliferation of weapons of mass destruction, etc.) will be included among the military's responsibilities, requiring the military to properly plan for their occurrences just as they would for "traditional" missions. The spectrum of warfare, that currently encompasses low-intensity to high-intensity combat engagement, will also include these "non-traditional" missions, called operations other than war (OOTW) that draw on military resources, but may not involve combat operations as the central focus. Future generations will consider OOTW to be military activities that constitute warfare (Alberts, 1996).

Since the ending of the Cold War, the U.S. military has been tasked to expand its capabilities and assume a diverse set of roles in the global theater. As the times continue to change, the military will be called upon more frequently to conduct "non-traditional" missions around the world, because it is the only remaining global superpower that has the capability to deploy an effective force anywhere in the world. The extensive communication ability, rapid mobilization capability, and crisis response familiarity makes the U.S. military a prime candidate to assume the new responsibilities of responding to OOTW in the future (Alberts, 1996).

Even while assuming a new role in global affairs, the U.S. military will have heavy expectations placed on it by the international community. Enhanced media coverage coupled with a recent success in OOTW missions have led to increased expectations of performance. Military forces will be expected to conduct these missions precisely, quickly, and with minimal casualties or collateral damage to civilian holdings. To many domestic and international leaders, precision engagement and casualty minimization are important and believably achievable goals (Alberts, 1996).

Additionally, television, radio and other news reporting sources like CNN, report international events as they unfold, which puts pressure on the senior national leadership to react quickly in making decisions to respond to breaking events (Alberts, 1996). Therefore, the speed of information perpetuated by the media forces an increased decision-making cycle with which military leaders at all levels must contend. Thus, the military force of the future must be prepared to assume new roles and accomplish different missions with increased efficiency.

3. Information Age Warfare

The widespread advances in and increasing use of information technologies will greatly affect warfighting in the future. Warfare in the Information Age will present more challenges than those faced by military forces today. The results of the global technical revolution currently taking place are new concepts and systems that will definitely affect warfare in the Information Age.

a. Concepts

The Information Age is having a substantial affect on the dimensions of time and space, which is increasing the complexity experienced on the battlefield. Distance and location of warfighting actors is becoming irrelevant since information and corresponding decisions can travel anywhere in the world nearly instantaneously. Enabled by advances in information technologies, the time dimension in warfighting will also becoming more compressed. IT systems utilization has significantly reduced the amount of time necessary to gather and analyze information to make decisions. At the same time, global reach enabled by long-range satellite, and data communication networks reduces the need for time-consuming travel (Alberts, 1996). The Information Age, however, acts as a double-edged sword: on one end, it allows users to collect and

process data at speeds that enable decision-makers to make better, more informed decisions faster; yet, on the other hand, the same concept reduces the amount of time available to decision makers (Alberts, Garstka, & Stein, 1999). On the future battlefield, warfighters will have to find new ways to respond to the rapidly increasing decision cycle.

b. Systems

When once the military was at the forefront of innovative technology, now the rapid advances of the commercial industry have made the military a common user among many. For military operations performed in the future, military forces will begin to implement and integrate IT systems that enhance their operational ability. In fact, several IT systems are already in widespread use including satellite communications, wireless networks, video tele-conferencing, digital communications systems, integrated distributed networks, basic computing equipment, Global Positioning Systems (GPS) and many others. Since the equipment development and production cycle for the military is extremely slow, military forces will have to rely on procuring commercial-off-the-shelf (COTS) systems to accomplish future missions. Another problem that emerges is the increase in vulnerability to potential foes that will have access to the same COTS items (Alberts, 1996). Therefore, in the future, military forces will not be able to assume that they have a definite technological advantage over the enemy.

David Alberts, a member of the DoD C4ISR Cooperative Research Program, captured the issues discussed above and accurately prophesied potential military requirements in his foreshadowing book *The Unintended Consequences of Information Age Technologies* (1996):

...Warfare in this information age will require complex planning and coordination, very near real time and total situational awareness, decision support systems that filter and fuse information very rapidly and perform simple plan extensions and revisions almost automatically, and massive database and information exchange capabilities to track both friendly and enemy situations as well as rehearse and forecast battlespace dynamics.
(p. 28)

The above quote, along with other thoughts expressed throughout the book, includes many of the same ideas of current experimental warfighting concepts. As was the case for Maneuver Warfare, the nature, theory, and preparation for future war

described in this section drive the standards and method of conducting warfare in the future. These factors do not replace the factors of war defined previously, but they do augment the original factors to produce an environmental context that is defined by operating in an information age. Thus, warfare in the future as described in this section, will still be considered war, but it will be affected by more factors than the practice of warfighting is today. Consider the information in this appendix while examining and interpreting the two emerging concepts of warfighting: RMA and NCW. Both emergent concepts seek to create a military organization that can function efficiently on tomorrow's high-technology battlefield.

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